Sole Agency
for
DENTAL-NOVELTIES
in
Czechoslovakia and Austria

Accepted by

Dental-Depôt
A. HERZOG
Panská 9,
Prague II,
Czechoslovakia

Introducing

C-I METAL

(FOR CHILDREN'S INLAYS)

A highly burnishable casting metal especially alloyed for cast inlays in deciduous teeth. Recommended also for retaining appliances for orthodontic purposes. It does not discolor readily. We suggest that you order a trial ounce at $1.50. Through your dealer or direct.

GOLDSMITH BROS.
SMELTING & REFINING CO.
Established 1867
5 N. Wabash Avenue Chicago
74 W. 46th Street New York
Plants: — Chicago — New York — Toronto

CONTENTS FOR OCTOBER, 1933

Original Articles

Correlation Between the Rhinologist and the Orthodontist. Harry Neivert, M.D., F.A.C.S., New York, N. Y. ---- 989
The Spring Loop Mechanism Embodied in Labial or Lingual Arches or as an Independent Appliance for Correcting Malocclusion. Herbert A. Pullen, D.M.D., Buffalo, N. Y. ---- 994
Diagnosis of Speech Defects. Mrs. Oluf Sturcke, Ossining, N. Y. ---- 1007
Correction of Nasal Deformities by Plastic Methods and by Transplantation of Bone and Cartilage. William Wesley Carter, A.M., M.D., F.A.C.S., New York, N. Y. ---- 1012
Preanesthetic Medication. Barbiturates. George F. Seeman, D.D.S., Nashville, Tenn. ---- 1017
Orthodontic Treatment Methods Employed by the Writer. George R. Moore, D.D.S., M.S., Ann Arbor, Mich. ---- 1019
Resorption Due to Impacted Canine. Richard H. Stucklen, D.M.D., Wilmington, Del. ---- 1026
Dental Health Survey ---- 1029

Department of Dentistry for Children

How to Practice Dentistry for Children as Preventive Orthodontics. Herbert R. Foster, M.S., D.D.S., Oakland, Calif. ---- 1031
Should Deciduous Teeth With Nonvital Pulps Be Treated? Stuart Kabnick, D.D.S., F.A.I.C., Philadelphia, Pa. ---- 1043
Diet and Dentition. Charles A. Sweet, D.D.S., F.A.C.D., Oakland, Calif. ---- 1059

(*Continued on page* 8)

Exclusively Engaged
in providing

Professional Protection

Thirty-four Years of

The Medical Protective Company
of Fort Wayne, Ind.
WHEATON, ILLINOIS

CONTENTS FOR OCTOBER, 1933

(Continued from page 7)

An Original Classification of Pyorrhetic Lesions to Be Used in Surgical Intervention. M. Francis Wielage, D.D.S., Miami, Fla. ---- 1059
Are Children More Resistant to Disease Than Adults? Cecil W. Thompson, D.D.S., Detroit, Mich. ---- 1062
Canker Sores. Howard H. Burkart, D.D.S., Northville, Mich. ---- 1066
The Search for Health, Happiness, and Success. Marie Davies Smith, Salem, Oregon ---- 1068

Abstracts of Current Literature

Nutrition and Pediatrics ---- 1070

Correspondence

A Quick Working Model ---- 1074

Book Reviews

Book Reviews ---- 1075

Editorials

The Nationwide Survey by the A.D.A. to Determine Dental Needs ---- 1080
Learning to Improve Ourselves in Dentistry for Children ---- 1082

News and Notes

News and Notes ---- 1084

The International Journal of
Orthodontia and Dentistry
for Children

(All rights reserved)

VOL. XIX ST. LOUIS, OCTOBER, 1933 No. 10

ORIGINAL ARTICLES

CORRELATION BETWEEN THE RHINOLOGIST AND THE ORTHODONTIST*

HARRY NEIVERT, M.D., F.A.C.S., NEW YORK, N. Y.

ORTHODONTIA is more closely associated with rhinolaryngology than any of the dental specialties. If we accept the definition of orthodontia as given, for instance, by McCoy in his text on *Applied Orthodontia,* then the first studies in orthodontia must take up the relations of the nose and throat to the mouth. This definition starts as follows: "Orthodontia is the study of dental and oral development. It seeks to determine the factors which control growth processes to the end that a normal, functional and anatomical relationship of these parts may be realized, and aims to learn the influence necessary to maintain such conditions when once established."

To a great degree, the causes of malocclusion and irregularity of teeth with the sequellae thereof, begin in the realm of rhinology. Without some understanding of the anatomy and pathology of the nose and pharynx, it would seem to me the orthodontist's knowledge would be incomplete and good results would necessarily be more difficult to attain. The fields are so closely allied that I have often wondered whether it would not be best for the patient as well as the orthodontist if he were compelled to study rhinology first.

I feel very strongly that the orthodontist has a great responsibility. He sees the patient more regularly than does the dental practitioner, and surely more often than the rhinologist. His attention is constantly on the mouth, and if he be on the alert, as I have emphasized in talks to the postgraduate orthodontia class at the Columbia Dental School, he can be of the utmost importance in guiding the child during the growing period so that there may

*Read before the New York Society of Orthodontists, New York City, November 14, 1932.

result a perfect development, not only of the teeth and mouth, but of the entire face.

Embryologically, we can see how closely are related the parts that we are both interested in. The primitive mouth or stomodeum is formed by the invagination of the epiblast until it meets the anterior end of the foregut, which is the future pharynx. The nose and mouth in early fetal life constitute one chamber. About the eighth week a maxillary process grows horizontally inward from each lateral wall of this oronasal cavity, so as to form a partition between the nose and the mouth. On each side, a median frontonasal blade descends from the frontal region, their lower ends dividing to form the primitive nasal pits. Imperfect union of the frontonasal blades in the median line accounts for various nasal deformities later in life. The descending frontonasal blades carry the two central incisor teeth and form the front part of the hard palate which is called the premaxilla or the intermaxillary bone. In the developmental defects of mouth-breathing, this bone is thrust forward and the central incisors project and overlap. The nasal septum is formed from a center on either side extending forward from the presphenoid center. If they fail to coalesce, the cartilaginous septum will be split lengthwise, and this results in nasal blockage, due to the thickened septum.

In this short paper I propose to discuss but a few conditions with which every scientific orthodontist should be acquainted. The most important is the obstruction to proper nasal breathing due to enlarged adenoids and tonsils, and intranasal abnormalities. While it may not be desirable that the orthodontist examine the nasopharynx with the finger or mirror as the rhinologist does, he should be able to look into the throat with a tongue depressor and recognize gross pathologic conditions, the noncorrection of which must certainly retard the progress of the orthodontic work. In the throat he should be able to recognize redness or congestion, crusting, or dryness of the mucous membrane of the pharynx, and especially congestion around that part of the soft palate adjacent to the tonsils. He should also recognize that the presence of small patches of reddened lymphoid tissue on the posterior pharyngeal wall is always a sign that there is something dripping down from the nose and sinuses irritating the pharynx. The orthodontist should be able to palpate the patient's neck in order to discover any enlarged cervical lymph glands, which are always the outward expression of involvement inside the nose and throat, and mouth. It is during the years when most orthodontic corrective work is being done that adenoids or other obstructions retard a proper development in the bony structures of the mouth and face.

Mouth-breathing in children is associated with maldevelopment of the dental arches, the maxillary bones and both the internal and the outer structures of the nose. Normal respiration is through the nose. As we understand it, air is warmed, moistened, and cleaned while passing through the nose and sinuses in order to prepare it properly for admission into the delicate air cells of the lungs. Adenoids, hypertrophy of the various parts of the Waldeyers' ring of lymphoid tissue, chronic hypertrophy of the nasal

mucosa and thickening or irregularity of the nasal septum all tend to prevent proper breathing.

All children have adenoids which vary in size from small almost imperceptible follicles to such enormous masses that they can be seen below the level of the soft palate completely filling the nasopharynx. What causes the excessive growth in some cases is not known. We do know that certain children have a tendency to redevelop lymphoid growths in the nasopharynx almost as soon as they are removed. In certain types of people, especially in negroes, this is particularly true. The lingual tonsil very often undergoes compensatory hypertrophy when the true tonsils are removed. Every child who has repeated colds undoubtedly has adenoids which are always in the state of chronic inflammation secondarily involving the sinuses. The least change in vasomotor control causes an acute inflammation and all the symptoms that go with it. What causes this change in vasomotor control and subsequent infection, in other words what causes colds, is a subject which we cannot settle here.

The symptoms of nasopharyngeal obstruction are extremely variable. In children of about three years of age, or a little more, a marked case presents a very typical picture. The mouth is generally held open, the lips are thick, the upper one highly arched, the teeth protrude, while the chin recedes. The alae nasi are narrowed because of disuse, and the nasal orifices are merely two slits instead of oval openings. The nasolabial fold is absent, and the disuse of the muscles between the upper lip and the eye gives the face a flat, smooth, characterless expression. There is generally more or less constant discharge from the nose with occasional excoriations and infections of the upper lip. At times the anterior nares is completely filled with hard, dried crusts. These children are restless in their sleep, breathe heavily and noisily. The mouth and lips are parched, and they wake up at night asking for water. Because they cannot get air through their nose while eating, they bolt their food. There is a marked difference in the voice of an adenoid child because there is no resonance. Quite largely with this blockage there must naturally develop secondary changes in the structures of the nose and sinuses.

One of the most serious consequences of nasal and pharyngeal blockage is involvement of the ears, and all the serious sequelae which may result therefrom. Various investigators have found that anywhere from 60 to 80 per cent of impaired hearing in children is secondary to enlarged infected adenoids. Not only are there various degrees of deafness, but there is always present the danger of mastoiditis, and the serious complications involving the vital structures surrounding the mastoid. The presence of infected adenoids and tonsils must undoubtedly increase the liability to the common contagious diseases, such as scarlet fever, measles, diphtheria, etc.

Another common condition is so-called glandular fever. It shows itself by swelling and tenderness of the lymph glands of the neck which often attain enormous size. They may undergo suppuration and lead to ugly scarring of the neck. Other secondary affections are chronic enlargement of the cervical glands, frequent attacks of bronchitis or chronic cough, disturbance of the gastrointestinal tract, especially vomiting.

There is a long train of so-called reflex neuroses which may be manifest in those with enlarged adenoids. Among them are night terrors, twitchings in the sleep, spasmodic condition of the larynx, chorea, stammering, stuttering, and even epilepsy.

Children with marked obstructions often do not develop physically and mentally in proportion to their age. Their face is narrow and high. Their chest wall is flattened and retracted. They frequently complain of headaches, are easily fatigued, irritable, listless, peevish, and bad tempered. They are poor mixers. They cannot concentrate upon their work, and they are often deficient in their studies.

Most of the symptoms heretofore mentioned are attributable to involvement of various components of Waldeyer's ring. These groups of lymphoid tissue are placed around the nasopharynx at the crossways where the food and air passages intersect each other. The main groups are the true, faucial or palatine tonsils; the adenoid or pharyngeal tonsil; the lingual tonsil in the base of the tongue, and the lateral columns of pharyngeal tonsil which lie back of the posterior pillars of the true tonsil. These latter are more or less swollen and reddened in all infections of the sinuses, especially the posterior group and can easily be seen while looking into the back of the mouth. They do not get the attention they deserve. Patients will complain that they have a raw sore throat, although the tonsils are out. If we look past the posterior pillars on the pharyngeal wall, especially laterally, we shall see the red swollen patches. Treating the throat in such cases produces no results. We must go higher and eliminate the cause. We do not know what the functions of the tonsils are. There are many theories, none of which have been proved. That they become easily infected and are the cause of a great amount of suffering, economic loss and permanent disability, is well known to all.

This brings us to a discussion of the sequelae of infections of Waldeyer's ring on the sinuses and ears. It is significant that Hippocrates associated the mouth with the sinuses and ears when he wrote that "those who suffer from headaches and running ear have a high arched palate and irregular teeth." As you well know, frequent infections of mucous membranes lead to hyperplasia and hypertrophy. This means that with the thickening comes narrowing of the nasal passages which results in obstructing the free passage of air. At the same time, the ostia of the sinuses are narrowed by the thickening of the edges of mucosa both in the sinuses and in the nose so that drainage is difficult. This creates a vicious circle which results in chronic sinusitis, the great bugbear of rhinology.

The same process goes on in the eustachian tube and middle ear, for we must consider these structures as accessory sinuses. The mucosa is continuous from nose to tube, to middle ear to mastoid cells. Infection travels along readily enough, but the irregularity and narrowness of these structures favor the retention of infection and its progress to serious sequelae.

Finally, a word about the nasal septum which we are both interested in. We are told by some that by spreading the alveolar arches the deviated septum may straighten, because the high arch will come down and make room for its normal development. The septum in a child is always thicker rela-

tively than that in an adult. The cause of deviation of the septum is practically always traumatic. A fall or a blow, yes, even intrauterine trauma which is never remembered, dislocates the nasal cartilage from its position on the vomer and there is compensatory bending higher up. The gap is filled in with callus, and the septum is therefore irregular or thickened and obstructs the ready flow of air. I therefore cannot see how the septum can be affected by the palate, inasmuch as we cannot prove which comes first, the high arching of the palate or the deviation of the septum. The relations between the septum and the palate make an interesting chapter in our correlated fields, and some day I hope to be able to present some scientific data which may cast new light on this subject.

THE SPRING LOOP MECHANISM EMBODIED IN LABIAL OR LINGUAL ARCHES OR AS AN INDEPENDENT APPLIANCE FOR CORRECTING MALOCCLUSION*

HERBERT A. PULLEN, D.M.D., BUFFALO, N. Y.

THE spring loop as a practical mechanism for the correction of malocclusion has been the object of much criticism over a period of years, much of which I believe has been undeserved, and it is my intention in this paper to attempt to evaluate properly this mechanism by describing its construction, its force principle, and its use in practice as an independent appliance or as included in the labial or lingual arches of various kinds.

The spring loop may be described as a loop of wire, Fig. 1, of various gauges from 0.020 in. to 0.030 in. diameter, independent of, included in, or auxiliary to

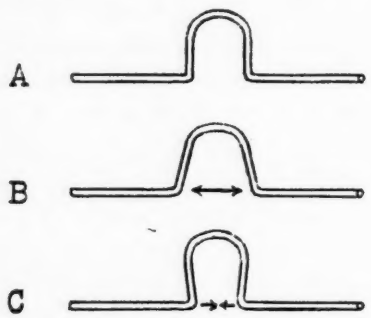

Fig. 1.

the labial or lingual arch wires for the purpose of securing extensile or contractile force in tooth movement.

There is nothing new in this principle of producing force. The older textbooks on orthodontia, especially Farrar's and Jackson's, are replete with illustrations of this device, alone or in combination with various appliances for tooth movement. Jackson's work, dealing exclusively with spring mechanisms attached to removable appliances, includes the use of the spring loop to a large extent.

In the process of evolution of appliances, the removable appliance, except as a retaining device, has been improved by fixing or stabilizing its anchorage, so that it is now a fixed-removable appliance, so called, the spring loops and spring arms having been preserved and attached to our modern appliances with fixed anchorages, the labial and lingual arches, with the result of increasing their efficiency and usefulness.

The spring loop, as included in a labial or lingual arch wire, usually anterior to the anchor tubes, acts to extend or contract the arc of the arch wire, thereby increasing or decreasing its length as desired, taking the place of the screw

*Read before the Pacific Coast Society of Orthodontists, San Francisco, February 18, 1932.

principle in the threaded alignment arch for the same purpose. The spring loop may be included at any point along the line of the labial arch wire where it is desirable to open or close spaces between teeth. Fig. 1 illustrates the simple spring loop at *A*, and its change in form at *B* and *C* for extensibility or contractibility respectively.

These loops may be made with any round-nosed plier but are more definitely and exactly made with a plier, Fig. 2, designed by the late Dr. J. Lowe Young. This plier has a two-step beak with two circumferences adapted for two different sizes of loops, which are all that are usually required.

Occasionally a loop may be made more quickly with one motion of a plier of the design shown in Fig. 3, but as a general thing this type of plier does not adapt itself as readily to loop bending along the line of the alignment arch as does the plier shown in Fig. 2.

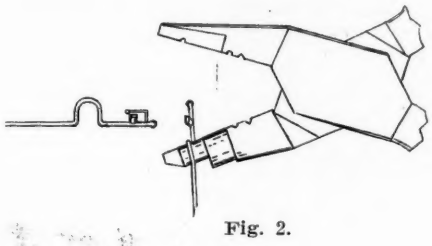

Fig. 2.

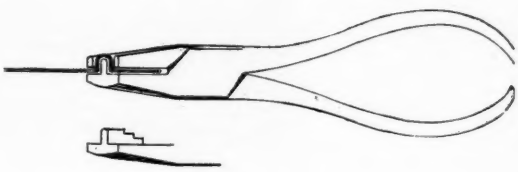

Fig. 3.

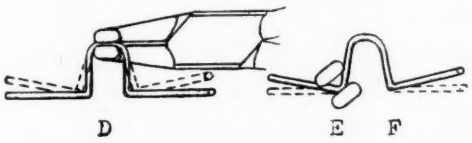

Fig. 4.

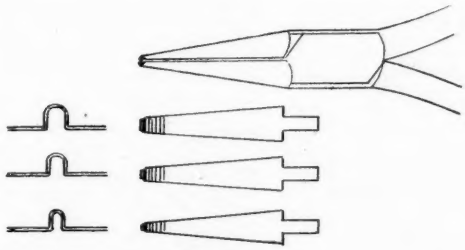

Fig. 5.

The manipulation of the loop for either extensile or contractile purposes must be very carefully done in order to preserve arch alignment and not tip the anchor teeth to which the spring loop may be directly or indirectly applied.

For example, to enlarge the loop, it must be opened by bending with a grooved plier, Fig. 4, at three points, at the top of the loop *D* and at the angles *E* and *F*, in order to keep the alignment of the arch wire in which it may be embodied. If this alignment of the arch wire is not always carefully preserved in the loop bending process, the anchor tooth or teeth will be tipped out of alignment.

The spring loop may be made in various sizes from the most diminutive to a very large one, Fig. 5, and in order to encompass all the various sizes as well as to continue the enlargement of a single loop from a smaller to a larger size, in extending its length, three sizes of pliers with beaks of graded sizes as shown in the illustration will be found necessary.

These pliers are all grooved at the extremity of the beaks so as to enlarge the loop without slipping, the grooves extending three-quarters of the distance around the beaks, thus keeping the wire in registration continuously.

In contracting the loop, Fig. 6, a special plier is used for the purpose, and the top of the loop *G* and the angles *H* at the base are all equally bent at the same time to preserve the alignment of the arch wire as at *I*.

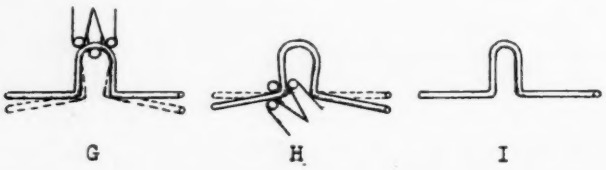

Fig. 6.

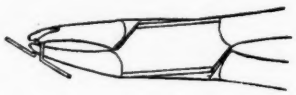

Fig. 7.

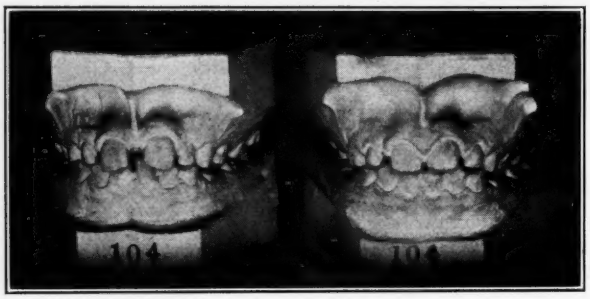

Fig. 8.

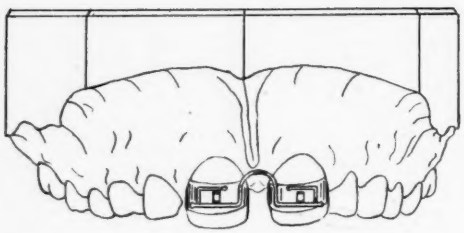

Fig. 9.

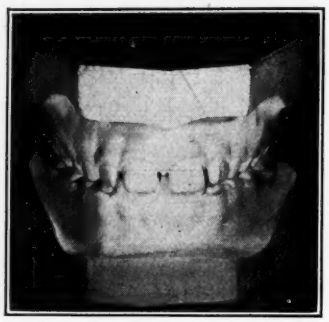

Fig. 10.

Fig. 11.

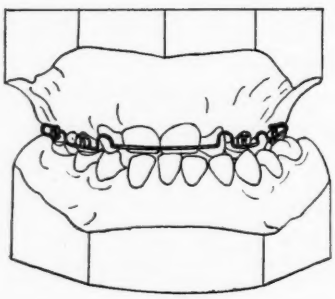

Fig. 12.

This plier has two arms in one beak and one in the other so that the wire loop is bent in a smaller arc when the double arm beak is applied at the top of the loop, Fig. 7.

As a simple independent mechanism the spring loop included in an appliance for closing the space between the central incisors caused by an abnormal

frenum labium, Fig. 8, using the principle of bodily movement, is an efficient appliance for this purpose.

Fig. 9 shows the appliance anchored to seamless bands on the central incisors by means of vertically attached half-round rods and tubes.

Fig. 10 illustrates a case in which the contractile force of the spring loop mechanism was used to move the central and lateral incisors together by bodily movement.

The loop mechanism adapted in the case, Fig. 11, is simply an extension of the appliance with additional loops attached to bands upon all the incisors. Closing the loops and preserving the alignment of the base wire will move all the incisors mesially.

A further extension of the spring loop mechanism would carry it as far as the molar region when it would be included in arch wire form and designated

Fig. 13.

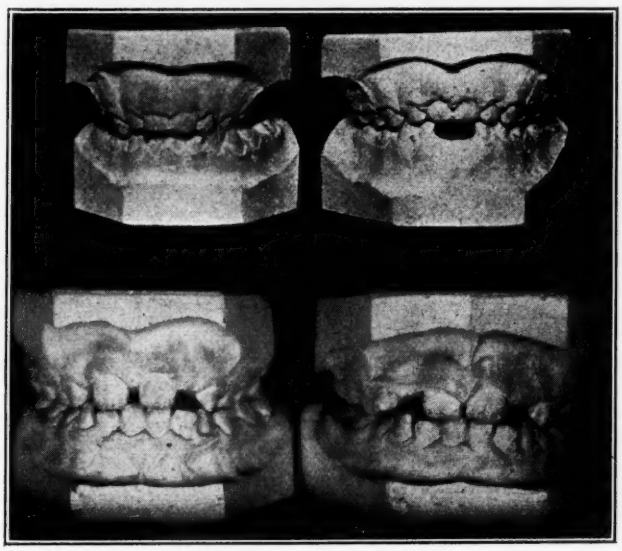

Fig. 14.

as the junior pin and tube appliance, Fig. 12. The extensile loops are between the canines, and mesial to the first molars.

By opening the anterior loops very slightly at intervals with a little lateral spring to the arch wire, the linguoversion shown in Fig. 13 will be corrected.

A similar unilateral linguoversion in the mixed denture, Fig. 14, with the maxillary arch undeveloped anteriorly, will respond to treatment with the junior pin and tube appliance with loops placed so that partially closed spaces for unerupted incisors may be opened with them, space for abnormal frenum closed, and additional loops used laterally for increase in length of the arch wire.

This junior pin and tube appliance exhibits three loops between the canines, Fig. 15, the center one requiring closing to move the central incisors together, the other two requiring opening to open the partially closed spaces for the unerupted lateral incisors. The addition of the two loops, one in front of each first molar, while not always necessary, has the possibilities of control in length of the arch wire when desired.

The senior pin and tube appliance, Fig. 16, exhibits a labial arch wire to be attached to the permanent teeth by the half-round pins and tubes, and affords great possibilities for the insertion and use of the spring loop mechanism for creating space along the line of the arch where needed, especially in the canine region.

Fig. 15.

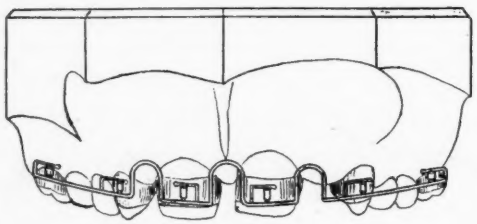

Fig. 16.

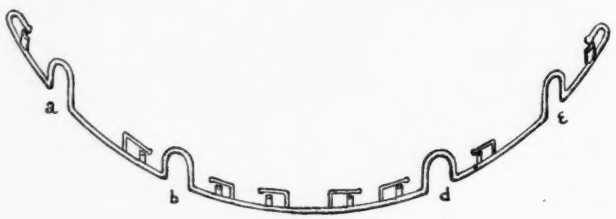

Fig. 17.

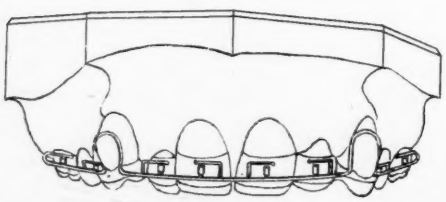

Fig. 18

Fig. 17 exhibits the use of the senior pin and tube appliance in a neutroclusion case (maxillary arch) where the canines are in labioversion, the spring loops encircling the canines providing space for them in the arch line during the general development of the maxillary arch by bodily movement.

The before and after treatment casts of the case are shown in Fig. 18.

A more complicated case, Fig. 19, in which the maxillary incisors were knocked out in an automobile accident, and treatment was delayed until the canines erupted and drifted mesially for several years, exhibits great possibilities for the use of the spring loop mechanism embodied in the senior pin and tube appliance.

Fig. 20 exhibits the application of the senior pin and tube appliance with contractile loops between the canines and first premolars on each side and a triple extensile loop between the canines anteriorly for moving them distally.

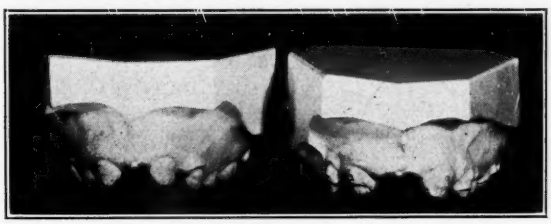

Fig. 19.

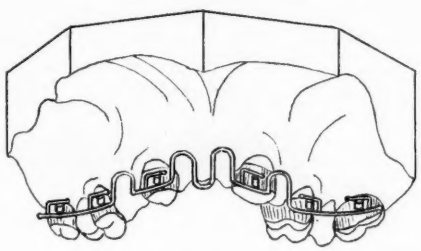

Fig. 20.

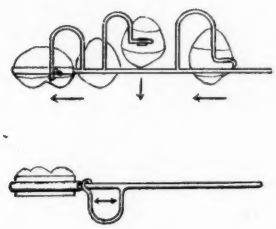

Fig. 21.

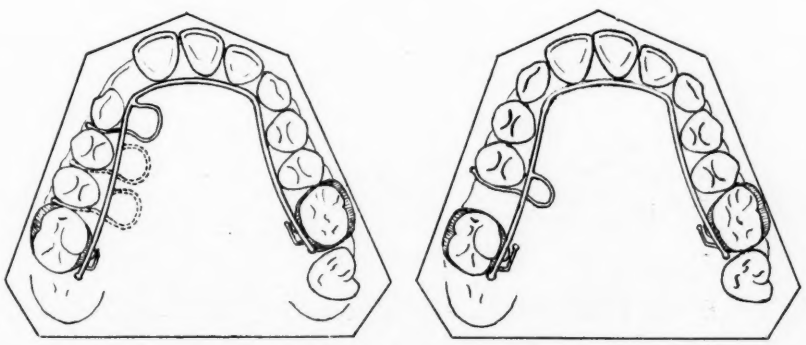

Fig. 22.

In operation of this appliance the anterior loops are slightly opened and the distal loops slightly contracted at a sitting, keeping an even balance between the two forces exerted by the loops.

Simple spring loops attached at various points along the labial arch wire for control of the entire arch wire or for single tooth movements in the horizontal or vertical plane are illustrated in Fig. 21.

Auxiliary spring wires on the lingual arch are usually partially or completely hidden from view by the base wire when the spring wires are attached gingivally to the base wire, but it is advantageous in obtaining certain tooth

movements to use the spring loop mechanism when, in order to get the full use of the loop of the spring, the loop itself is attached so that it is in plain view.

Fig. 22 illustrates the use of the spring loop successively attached to a lingual arch and applied distally to the canine and first and second premolars in a maxillary arch to close up the space for a missing lateral incisor on the right side. The drawing on the left shows the first attachment of the spring loop and the second and third attachments in dotted lines for the mesial movement consecutively of these teeth. The drawing on the right shows the completion of the operation with the last spring loop in position, ready for the last operation of moving the first molar mesially to contact with the distal surface of the second premolar.

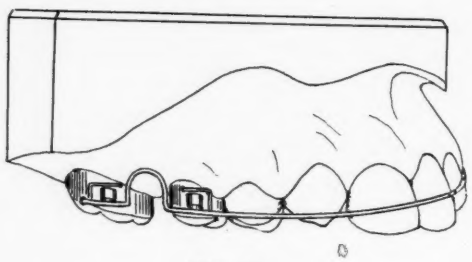

Fig. 23.

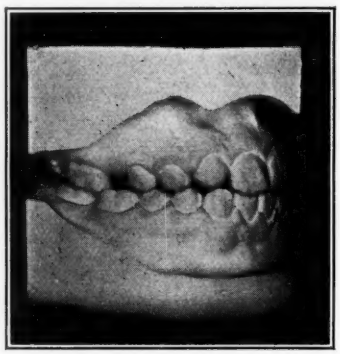

Fig. 24.

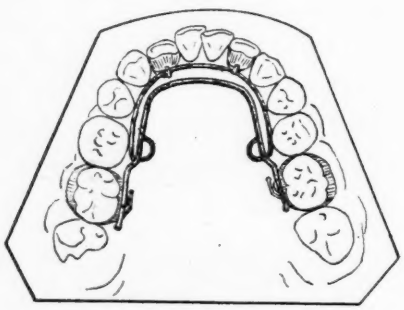

Fig. 25.

In this case the right second premolar might have been banded and the lingual arch reanchored to this tooth with a spring loop attached distally to move the first molar mesially, but another method provided so much greater reenforcement of anchorage that a change was made to the labial arch, Fig. 23, for the purpose.

By the use of the pin and tube appliance labially, attached from the left first molar to the right second premolar, the resistance of all the intervening teeth could be used as anchorage for the mesial movement of the first molar on the right side with the sping loop mechanism attached between the molar and the second premolar on that side.

Fig. 24 illustrates the casts at the stage of treatment shown in Fig. 23 of the case in which this combination of appliances was used.

In the continued evolution of the lingual arch there are bound to be certain unorthodox combinations which present valuable features in treatment. Such a combination is illustrated in Fig. 25, exhibiting a lingual base wire of the usual type but with an auxiliary spring which is a continuous loop from one second premolar to the other, and capable of increase in forward and lateral force by means of closing and manipulating two small loops on the under side of the base wire where they are attached.

By anchoring this secondary lingual arch of smaller diameter than the base wire underneath lugs on seamless bands on the lateral incisors, a very stable appliance incapable of being lifted by the tongue is obtained, as well as a very effective one in aligning all the teeth mesial to the first molar.

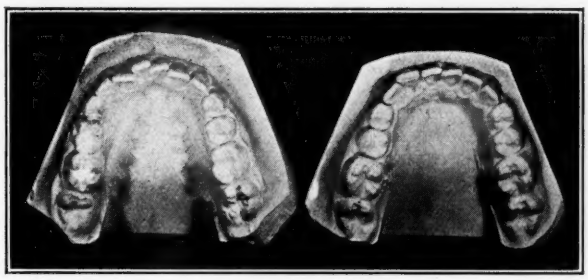

Fig. 26.

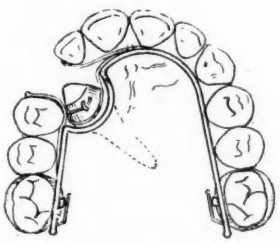

Fig. 27.

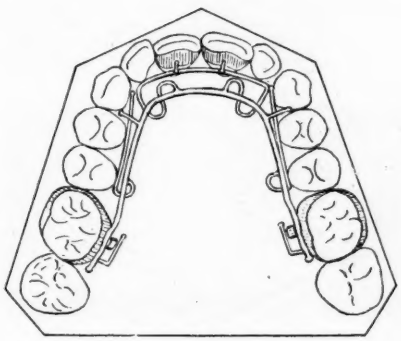

Fig. 28.

Fig. 26 illustrates the mandibular casts of the case in which this particular appliance was used. The expansion of the maxillary arch was obtained through the use of the one mandibular lingual arch with its combination of the large lingual spring loop.

Fig. 27 exhibits the use of a loop spring attached to the lingual arch for the purpose of extruding an impacted canine and moving it into the arch line. The recurving of the spring increases the distance it can be extended in use.

Another combination of auxiliary springs including the spring loop mechanism is illustrated in Fig. 28. Here the anterior lingual auxiliary spring is a closed loop extending from canine to canine but including two double loops on each side before being attached to the base wire. The stability of the loop is assured by the use of supporting spurs on seamless bands on the incisors.

The double spring loops allow a greater degree of extensibility of the larger closed loop in the labial movement of the incisors. The lateral expanding auxiliary springs are attached by spring loops extending palatally which allow a certain amount of buccal rotation on the axis of the attachment near the base wire which permits the buccal movement of the second premolar. However, it possesses no advantage over the simple recurved springs attached lingually to the base wire in the orthodox manner, as shown in Fig. 29, except that they can be made of a larger diameter spring wire, 0.025 in. diameter, which will not break or become displaced as easily as the 0.020 in. diameter spring wire.

Fig. 30 illustrates another combination of spring loops in connection with the lingual arch for general expansion in which the anterior auxiliary springs

Fig. 29.

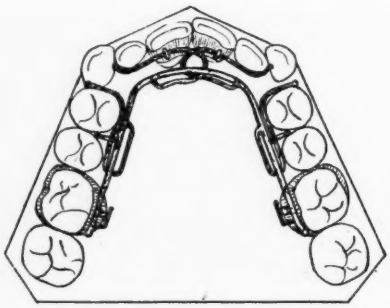

Fig. 30.

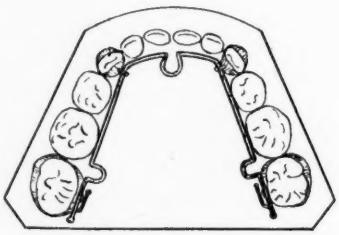

Fig. 31.

Fig. 32.

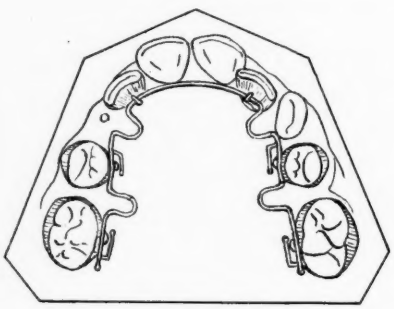

Fig. 33.

do not combine to form a closed loop, but each has a separate recurved spring loop extending under spurs on seamless incisor bands for fixation or stabilization of the appliance. Here, the lateral expanding springs attached palatally to the base wire consist of simple recurved springs in loop form kept in place by lateral stabilizers, and allowing a larger size spring wire, 0.025 in. diameter, than usual.

Considering next the spring loop mechanism embodied in the base wire of the lingual arch itself, Fig. 31, we come to a very interesting appliance which possesses the advantage of expansion of the arch without the use of any auxiliary springs. In other words, by including three spring loops in a smaller base wire 0.025 in. diameter, one in the center, for lateral expansion, and one in front of each anchor lock for anterior expansion, the lingual arch itself produces its own force mechanism for dental arch development.

Again, this appliance should be stabilized by the use of supporting spurs extending from seamless bands on the deciduous canines, although the appliance will work equally as well on the permanent dental arch as it does on the mixed denture.

Fig. 32 exhibits the casts, before and after treatment, of the mandibular arch in which this appliance was used.

This appliance, while differing radically from the usual lingual arch, possesses certain advantages of simplicity of construction which commend it to the experienced operator who understands the control of loop mechanisms to the degree of being able to preserve alignment of the arch wire on each opening or adjustment of the spring loops.

A still more radical departure from the lingual arch with auxiliary springs is a 0.025 in. lingual arch which includes four spring loops within its compass, Fig. 33, the anterior loops serving the purpose of anterior expansion and forward movement of the lateral incisors, while the posterior loops open up the spaces between the molars and first premolars for the unerupted second premolars.

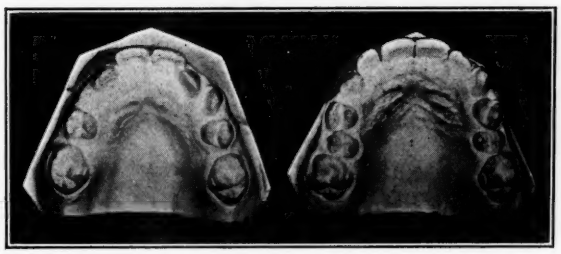

Fig. 34.

This lingual loop arch will accomplish the tooth movements as indicated, as shown in the after treatment cast in Fig. 34, but still leaves some detail work to be done on individual teeth, such as slight rotations or buccal movement of the newly erupted second premolars, which can more easily be done with the application of the labial arch with spurs and ligatures on banded teeth.

However, the value of this description of the use of a lingual arch with the maximum of spring loops included is to show the limitations of the appliance as well as its possibilities.

A simpler combination of the 0.025 in. lingual arch, anchored with the half-round tube and rod lock on the first premolars, Fig. 35, embodies spring loops at the extremities of the arch wire for opening up spaces for unerupted second premolars.

The unusual feature about this appliance is the pivotal round rod and tube located on the lingual surface of the first molar bands and operating in the horizontal plane, thus illustrating a correct combination of a fixed anchorage on the first premolars for sufficient resistance to move the first molars distally, their resistance being lessened materially by the use of the pivotal anchorage in the horizontal plane.

In favorable cases the lingual spring loop may be extended through spaces between teeth, as in Fig. 36, to move a lateral incisor lingually and mesially.

Occasionally, the extension of the lingual spring loop labially or buccally may be made in the occlusal embrasures, preferably between the canine and first premolar, though not infrequently between the canine and lateral incisor, or lateral and central incisor.

The anterior arc of the labiolingual arch, Fig. 37, is of itself a spring loop, controlled by two lateral spring loops. The labiolingual arch with a lingual loop inclined plane is an effective combination of the lingual arch, labial arch with spring loops, and the lingual loop inclined plane. Although the loops in the plane are not used for contractibility or extensibility, they are passively used in the formation of the inclined plane which is a force producing mechanism.

In conclusion it may be said that the object of this paper is to analyze the spring loop mechanism, alone and in combination, to describe its proper forma-

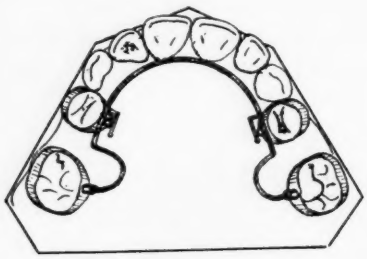

Fig. 35.

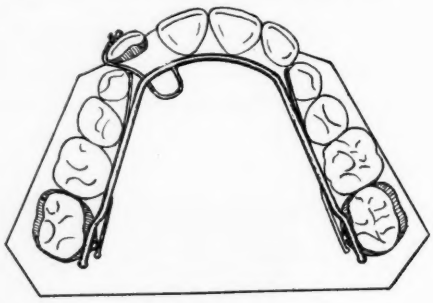

Fig. 36.

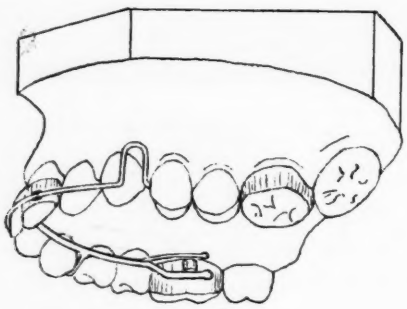

Fig. 37.

tion and manipulation and its various uses as an independent mechanism or as embodied in the labial or lingual arches.

In a final appraisal of this mechanism from the analysis made, it may be stated that it possesses value as an independent mechanism for closing spaces along the line of the arch, especially in the incisor region.

Included in the labial arch of the pin and tube variety, or any other using a fixed bracket, such as the McCoy open tube which is capable of fixation, the Angle bracket mechanisms, or similar ones, the spring loop mechanism is of value for opening or closing spaces along the line of the arch if the arch wire is not larger than 0.025 in. in diameter.

As an auxiliary spring loop it possesses value in moving teeth mesially or distally along the line of the labial or lingual arch, for rotation, and for moving unerupted teeth into the occlusal plane.

Embodied in the junior pin and tube arch of 0.022 in. to 0.025 in. diameter

the spring loop mechanism may be used for enlarging the deciduous arch or mixed denture anteriorly and posteriorly, as well as to provide space for unerupted teeth.

In the senior pin and tube appliance the insertion of spring loops affords the best means of opening spaces for canines in labio- or linguoversion, and may be used to increase the length of the arch wire itself for general expansion of the dental arch.

Spring loops may be used in this type of appliance, opposing each other for tooth movement, one set by contracting, the other by opening or extending, an ingenious combination of two oppositely acting forces.

As an auxiliary mechanism connected to the lingual arch in the form of a single lingual loop or partial arch wire attached by and operated by secondary loops, it affords a simple means of alignment of the anterior teeth, especially when stabilized by spurs on incisor bands.

Included in a lingual arch of 0.022 in. to 0.025 in. in diameter in front of each anchor lock, these spring loops offer a simple method of enlarging the dental arch; and, if a third loop is included in the median line of the arch wire, especially of the mandibular arch wire, an effective means of lateral expansion anteriorly is obtained without the use of auxiliary springs.

The use of a number of loops in the 0.022 in. to 0.025 in. lingual arch for opening spaces and for arch enlargement, while within the range of possibility as shown, requires great care in manipulation, and necessitates the final substitution of the labial arch for alignment of individual teeth, rotations, et al. However, it is more prophylactic in its position than the labial arch and can be recommended in its simpler forms.

Attached to the lingual arch labially to form the labiolingual arch in the form of a labial spring operated by two included spring loops, it forms a simple and efficient appliance for treatment of labioversion of the anterior teeth of either arch in neutroclusion not complicated by an abnormal underbite.

Its limitations have been described and in practice should be recognized and observed in order that its usefulness may not be prejudiced by wrong manipulation or too great complication in the number of loops used.

Its combinations are almost inexhaustible, and I have shown only the most important simple and complex ones to prove its value.

DISCUSSION

Dr. Allen E. Scott, San Francisco.—We have listened to a most interesting and instructive paper, a paper replete with most valuable technical information.

The spring loop mechanism has been subjected to criticism but has stood its ground for many years and is at the present time, I believe, in the great majority of cases one of the finest appliances at our command. This is so because it is as nearly a perfect physiologic appliance as anything that has ever been devised. It exerts a continuous and gentle pressure; the technic of construction is not highly complicated; and once properly adjusted it produces a mechanical stimulation for three or four weeks. With various modifications it can be used to treat almost any conceivable type of malocclusion; its application is almost universal.

Dr. Pullen has invented many instruments of various descriptions, and it is interesting to note the use to which these are put. Throughout his professional career he has been able to invent a pair of pliers when he could not find what he wanted to accomplish his purpose.

When we wish to move two maxillary centrals together, the spring loop can be used to advantage. Rotation can also be had by the proper placing of the tubes on the bands.

The same applies to the maxillary lateral incisors. The junior pin and tube appliance is most valuable in the treatment of mixed dentures, as is the senior pin and tube appliance in older patients. It is interesting to note the large number of springs and attachments that have been employed. In this connection I think that in some cases small elastic bands can be used in place of elaborate springs. Elastic bands are gentle in this action and are not so liable to be dislodged by the forces of mastication.

The use of 0.025 in. wire for a lingual arch is a radical departure from what we were taught at our last meeting, but by stabilizing it in the anterior region I see no reason why it could not be used effectively. It has, however, been my experience that such stabilization by using the mandibular deciduous canines results in this premature loss which is not a serious disadvantage. After listening to this paper I still think that the use of 0.040 inch wire with 0.020 in. auxiliary springs but without anterior stabilization is preferable to 0.025 in. with stabilization. The application of this appliance to conditions where there are impacted premolars is most interesting and brings to mind the Robinson attachments. It has an advantage in that it produces bodily movement by employing stationary anchorage. Here again I feel that an 0.040 in. wire with 0.020 in. springs properly controlled is perhaps an easier, simpler and better way to produce space for these teeth. In the construction of his appliances Dr. Pullen places the lock wire in some instances distal to the molar tube. He probably does this in order to keep the lock wire away from the loop. Wherever possible I think the lock wire should be soldered mesial to the molar tube, as in this position it acts as a stress breaker and assists in reducing breakage at this vulnerable point.

Dr. Herbert A. Pullen.—I agree with almost everything that Dr. Scott has had to say, because it is my common practice, e.g., to do just as he has described in regard to the rotating central incisors by proper placing of the tubes on the bands. I did not want to extend the paper by showing these things, but I think that they should be brought in the discussion.

As to his preference for the forty-thousandths inch lingual arch wire—of course I prefer it for its stability, when used as a base wire, but it is much too large to use when the loop is embodied in the base wire.

If you get good results and you avoid some pitfalls and some troubles, you have accomplished something for your own particular good in the use of that unorthodox adaptation, so to speak. You will have to make allowances for the individual case and for emergencies of various kinds.

The lock wire anterior to the molar is, of course, standard. However, in a few cases the lingual arch wire itself, of twenty-five thousandths, was shown acting as its own lock wire. I do not think that is undesirable, provided that the arch wire does not frequently break. If you find frequent breakage—but I have not found that they break frequently either way—I think there is another feature entering into it—the crystallization of the arch wire by undue bending anterior to the lock. Especially—here is a point that may not have been brought out before—if you do not stabilize the anterior part of the lingual spring wires, the patient will many times get his tongue under them and bend them so that they will flop up and down right in front of the arch lock and will break. I do not think that will happen if the arch is stabilized as I have shown.

I have not overstabilized the arches in the illustrations. I seldom use these stabilizing bands, but when I feel it is necessary to stabilize, I do so. For instance, a patient came back with the mandibular lingual arch wire bent upward a quarter of an inch. I bent it back, put bands with spurs on two lateral incisors and stabilized the arch. There was no more trouble.

Dr. Mershon has given us the finest presentation in the lingual arch that could be given, and I am in entire accord with the use of the forty-thousandths base wire as he describes it. The fine auxiliary springs are protected with guards, and they do the work in the most gentle manner so as not to overstimulate growth or break down tissues, but as far as possible to simulate the pressure stimuli that occur in the natural growth of the dental arches. I do not wish to detract in the least degree from the fundamental technic of Dr. Mershon by illustrating certain radical departures therefrom in order to exhibit the possible uses of the spring loop in a lingual arch or auxiliary spring.

DIAGNOSIS OF SPEECH DEFECTS*

MRS. OLUF STURCKE, OSSINING, N. Y.

Director of Speech, Pediatric Department, Columbia University, at the Post-Graduate Hospital

THE subject which I am presenting is by no means an unfamiliar one to you. As an orthodontist you have undoubtedly observed the peculiar forms of speech which accompany many conditions of malocclusion of the jaws and teeth as well as the specific type of speech defect known as cleft palate speech. I consider it a signal opportunity for the cause of good speech to have the subject brought before your organization.

Of course the orthodontist has done a great deal in furthering good speech by the splendid advances made in repairing the organic defects such as cleft palate, malocclusion and other deformities of the buccal cavity which serve to impede the proper use of that part of the speech mechanism. Orthodontia and oral surgery have indeed contributed much to the field of speech correction, and many attempts at securing correct speech would have been fruitless if it were not for the excellent work of experts in these fields.

Unfortunately, however, the development of good speech requires that something more than oral surgery or orthodontic work be done. No matter how well this work is accomplished, no matter how successful the operation may be, there is still the problem of establishing the production of correct speech sounds. Many an oral surgeon has been discouraged and dissatisfied after performing a successful operation because the patient was apparently unable to talk any better than before.

The surgical operation should be regarded as the preliminary factor in the acquiring of correct speech, the success of which will depend upon the effectiveness of operation, the work of the orthodontist in correcting the malformation of teeth or palate or in reshaping the oral cavity, the corrective methods of the teacher, and the cooperation and perseverance of the patient. Without the corrections of the orthodontist and the oral surgeon, we should have a defectively formed instrument of speech and voice and could not expect to get normal speech or voice from it any more than we could expect to get normal music from an abnormally formed violin. Speech is a habit formed principally through the auditory impressions, but if these impressions are interfered with by a defective speech mechanism, it would follow that we must cure or alleviate the physical condition first.

In the diagnosis of speech defects the teacher of speech finds besides stammering and stuttering, lalling, defective phonation, foreign accent and speechlessness, those other conditions which are of more immediate concern to the orthodontic profession. I refer to those defects which are due to maladjustments of the dental development and to cleft palate. Cleft palate speech, lisping and those other peculiarities too individual in character to be classi-

*Read before the New York Society of Orthodontists, November 14, 1932.

fied, while directly concerned with orthodontia have also another aspect of interest to the speech teacher inasmuch as they sometimes lead to more complex conditions such as stammering and stuttering. In fact we might say that any form of peculiarity in speaking might very possibly lead to stammering and stuttering, especially where the afflicted is unduly sensitive or self-conscious. Even a misplaced tooth, a broken tooth or a decayed tooth with ragged edges has been known to cause the development of an impediment in enunciation because of the patient's effort to avoid it in speaking, thus causing a constrained usage of the tongue. This practice may cause overinnervation which can establish wrong mental images.

While certain of these types may indirectly be of interest to the orthodontist, lisping, cleft palate speech and certain other defects due to maladjustments of the teeth and jaws are more directly related to his work. We in the field of speech correction recognize cleft palate speech as being of major interest to the orthodontist, but before discussing this subject I should like to describe briefly the condition known as lisping. Lisping is an incorrect production of the sibilant sounds, and is divided into two forms, to which we have given the terms *lingual protrusion* and *lateral emission.*

Lingual protrusion, as the name signifies, is the protrusion of the tongue between the teeth, producing the sound of "th" for the sound of "s." This is often caused, as you no doubt have observed, by malocclusion of the front teeth or a sluggish condition of the tongue muscles or both. The tongue slips out between the maxillary and mandibular teeth and is with difficulty restrained. Often lisping is only temporary, from the loss of baby teeth or the desire to avoid striking a brace on the teeth. With the appearance of the permanent front teeth or the removal of the brace the difficulty is often overcome, but where the lisping persists it is necessary to resort to re-education of that part of the mechanism concerned in the production of the sibilant sounds.

Lateral emission, the emitting of air through one or other side of the mouth, is also a problem frequently involving malocclusion. The tongue muscles are here again incoordinated but instead of protruding are often buckled, preventing a clear stream of air across the center of the tongue. Accompanying this defect we frequently find a unilateral palate which can be restored to its normal position by tongue exercises. Other causes of this defect are holding the tongue to one side of the mouth, an overdeveloped or unilateral tongue, and hypertrophied tonsils. Where the trouble is largely a matter of irremediable malocclusion involving complications which cannot be coped with either because of obscurity of cause or inability to treat the result of variations of dental arches and palate formations as regulated by racial types and inherited family resemblances as to harmony between teeth and jaws or because of economic conditions or age of the patient, we are faced with a problem of fitting the individual correction to the defective mechanism.

Form, being controlled by function, speech may have a great effect on the conformation of the bones of the face. Proper muscular exercise of the mechanism of speech plays a large part in the correction of malocclusion.

Let us now consider the subject of special interest to the orthodontist—the correction of cleft palate speech. This correction is difficult, tedious and oftentimes disappointing. Most cleft palate patients, because of the physical disability causing them to use other muscles than those ordinarily concerned with speech, have acquired wrong muscular habits in their effort to produce sounds, and this has led to wrong auditory images. These improper impressions are difficult to eradicate because the patient does not seem to hear that he is making a sound imperfectly. Correct speech depends upon the correct position of the mechanism of speech as well as upon clear auditory images; therefore it is absolutely necessary for the teacher to show the patient the exact physical position for each individual sound before the mental images can be recognized. This physical placement is of utmost importance to the sufferer from cleft palate speech.

Beginning with the consonants in their quite definite order from labial to posterior palatals, we build up specific patterns for these elements of speech to replace the incorrect impressions already formed. There is a quite tangible psychological and pedagogical principle involved in choosing the labial group of consonants first, for here we can use all three agents of the speech cycle, namely, the visual verbal, the auditory verbal, and the kinesthetic verbal images in securing these sounds. Even though these sounds may often prove difficult for the patient to enunciate, there is the element of confidence instilled by the use of these three factors. Use of the mirror while striving for the correct action of the muscles involved in making the sound "p," for instance (which is formed by closing the lips, then separating the lips to allow the breath to come out in an explosive manner), permits the patient both to see and to feel the action which takes place, as well as to hear the product thereof.

After the consonants have been taught, beginning with labials and proceeding to posterior palatals, we still find a disagreeable nasal tone due to the inability to direct the air current through the mouth for the vowel. Tongue exercises are of the utmost importance in the correction of cleft palate speech, and a consciousness of the tongue, especially in its connection with the teeth and lips, helps in acquiring a vowel placement in the anterior part of the oral cavity instead of in the nasal cavity. In this way the patient will acquire the auditory image and stimulate the organs suggesting it through exercise. In connection with the tongue gymnastics which include the training of the soft palate, we have exercises which help in producing flexibility of the lips of special value to the harelip.

The next group of defects deals almost entirely with the younger child. Defective phonation, or exaggerated baby talk, a bad habit which unfortunately is encouraged by many parents, is as its name implies, a wrong enunciation of sounds. In many of these cases the orthodontist is of great help in the correction by eliminating dental defects. In the history of many of these patients we find an inherited weak speech center, which in turn causes a weak verbal image, often resulting in actual verbal deafness as found in the speechless child. Here again we find the task a pedagogical one. The speech

is built up, sound by sound, through imitation until a subconscious control has been gained. Good speech must be automatic, therefore unconscious.

Lalling, another large group, is the inability to control the muscles of the tongue in raising it for the palatal sounds, because of lack of coordination between muscles of tongue and the mental concept of the sound to be produced. The resultant speech is found frequently in the mental defective. This defect requires plenty of tongue exercise before attempting to acquire proper placement for speech sounds. Many times an apparently paralyzed tongue can be awakened by patient prodding with an applicator and muscular reactions set in.

The tongue-tied condition is similar to lalling in sound but is due to a physical difficulty which, being corrected, still leaves the tongue in an incoordinated condition and unable to rise for "l, t, d, and r." After the septum is cut and the tongue liberated by the surgeon, an intensive course of tongue gymnastics must be instituted.

The personal equation is such a dominant factor in the successful treatment of speech defects that I hesitatingly speak of the next group. Stammering and stuttering, because of the obscurity of most causes, have been a difficult subject for diagnosis and also for cure, because no matter what the primary cause may have been a secondary symptom has set in which requires different treatment from that which would have been applied to the cause. This second symptom being psychological must be treated with extreme delicacy; for as no two minds function in exactly the same manner, no two stammerers have the same mental reactions—for instance, one stammerer is afraid to speak before an audience and another before an intimate, one before a boy, another before a girl. So in treatment we must use the method which will give the greatest confidence and eradicate the element of fear engendered by the compulsive idea—"I cannot speak as others do." It is possible to place the onset of this fear at a given period, but in the majority of cases the growth has been very insidious, often beginning in early youth with the ridicule of his companions or fear of failure in oral recitations. This growth of fear coupled with a hypersensitive nature leads to a consciousness of the peculiarity of his speech. This awareness of the trouble will often cause the patient to make a more determined effort to produce the sound, resulting in overinnervation of the muscles in question. The physical manifestations of stammerers are usually of a similar nature, although in more or less marked degree, even where the mental causes have a wide divergence. The physical tics or spasms are not alone confined to the muscles of speech but may spread to the larger muscles of the body.

In the correction of this defect we must strive for the patient's confidence in the teacher and the method. Prove to him that this defect is one that only he can cure. Half the battle then is won. From then on it is a matter of the teacher's personality and doctrine against the patient's fear and incredulity.

A complete diagnosis of the symptoms of the mental, nervous and physical systems of the sufferer should be made before treatment can be prescribed. For this reason at the Post-Graduate Hospital we require examinations by pediatricians and phychiatrists before admission to the speech class.

There the patient is again examined for dental or orthodontic work before diagnosis of his speech defect is made. Here is where economic conditions hamper our work, because of the patient's inability to pay for good corrective orthodontic treatment.

I have spoken so often of the importance of the tongue gymnastics in the correction of speech defects that I should like to give the list of the exercises we use.

1. Raising the tongue to the nose.
2. Lowering the tongue to the chin.
3. Rotating the tongue around the lips beginning at the right.
4. Rotating the tongue around the lips beginning at the left.
5. Raising tip of the tongue to maxillary teeth.
6. Curling the tip of the tongue against the mandibular teeth.
7. Grooving the tongue.
8. Raising and lowering the uvula.

The eighth exercise is especially beneficial after operations for removal of adenoids and tonsils. These exercises will also control drooling. All these exercises should be given under control.

It is surprising how little is known about speech defects and their causes. Perhaps this is due to the fact that very little has been written on the subject and to the inability to lay down dogmatic rules because of the strong personal element entering into the correction.

Practically every other defect has been satisfactorily dealt with in our schools. We have schools for the deaf, the crippled, the blind, and the sick, while the poor unfortunate sufferer from a speech defect has been left to suffer in silence.

The great drawback in the intelligent treatment of this subject has been the attitude on the part of the general public regarding what can be done for correction. The opinion seems to be that it is an unfortunate defect which cannot be remedied or else that it will be outgrown. People do not seem to realize that the great majority of speech defects are of their own making. We have looked on speech as an inheritance when in reality it is an acquired faculty, acquired correctly or incorrectly through imitation.

Fortunately about 90 per cent of the human race acquire speech indirectly with very little conscious effort. One hears and repeats, and if the example is good, the resultant imitation will be good; but if the model be unworthy of imitation, the result will very probably be a speech defect. Unless there is a pathologic reason, there is no case that will not respond to correct treatment.

It is the moral, economic and legitimate function of educational institutions to correct speech defects. Education in its true meaning is the symmetrical development of the individual. Knowledge is of little value if one is handicapped by an acute speech defect. Lack of self-expression destroys health and happiness. It interferes with the expression of ideas and deprives the sufferer of his proper social and economic position in the world. It lowers the moral stamina by making cowards of its victims. To deprive a man of his speech is to deprive him of his greatest weapon in his fight for success.

CORRECTION OF NASAL DEFORMITIES BY PLASTIC METHODS AND BY TRANSPLANTATION OF BONE AND CARTILAGE*

WILLIAM WESLEY CARTER, A.M., M.D., F.A.C.S., NEW YORK, N. Y.

I ACKNOWLEDGE with a deep sense of my professional obligations the very close relationship that exists between the science of laryngology and that of orthodontia, and that from a practical, clinical point of view the sincere cooperation of these two great groups is essential to the best interests of the patient. I note with satisfaction that excellent results are now being secured in the management of certain cases where the value of cooperative effort is recognized.

Deformities of the nose may be grouped under two main divisions: *congenital* and *acquired*. The physical qualities of each may be due to distortion, to deficiency or superabundance of the material constituting the structure of the nose.

Congenital deformities of the nose are practically always accompanied by abnormalities in the development of the bones and soft tissues of the face and mouth. In some instances (as in wolf-nose) the skull itself is seriously involved.

The treatment of severe congenital deformities is sometimes a difficult problem; usually it is best solved through the concerted efforts of the orthodontist and the rhinologist.

By operative measures and by the use of molding appliances, we try to alter the misdirected forces of Nature and guide them along lines that will eventually result in the construction of a normal organ. In the correction of congenital deformities during early childhood, it is seldom necessary to resort to the transplantation of bone or cartilage. In these cases we confine our efforts to transposition and molding of the actively growing tissues that are already there.

It is now conceded by all who accept the laws of biology and physiology as being fundamental, that bone or cartilage from the patient's own body should be used as a transplant in any part of the body where tissues having the quality of rigidity or resiliency have been destroyed and need to be replaced in order to restore the part to its anatomic and physiologic perfection.

The use of foreign materials of any kind whatsoever, as implants into the living tissues, should be condemned unconditionally. By foreign substances I mean any material that is incapable of being nourished by the blood and being incorporated as a part of the living body.

If it can possibly be avoided, one should never concede to the wishes of a patient who prefers to have a foreign body introduced into his tissues rather than submit to the slight additional inconvenience attendant upon the transference of tissue from one part of his body to another.

It is unnecessary for me to say that excellent primary results in the correction of certain nasal deformities may be secured by the implantation of a

*Read before the Eastern Association of Graduates of the Angle School of Orthodontia.

foreign body. If the material is neutral to the tissues and if an aseptic operation has been performed, the improvement may be maintained for a considerable period of time. It is a well-known fact, however, that *Nature abhors the presence of a foreign body in the living tissues,* and sooner or later it will be absorbed or expelled by the so-called process of "working out," or it will become infected through traumatism or from the blood stream. The latter is liable to be the case should the patient contract one of the acute infectious diseases, especially influenza or typhoid fever. I have seen two patients whose ivory implants in the nose became infected, apparently from the blood stream, one two and the other six years after the operation. I have also seen a patient whose ivory implant had to be removed because of an infection following a slight blow on the nose. In another instance, four years after ivory had been implanted by a well-known

Fig. 1. Fig. 2.

Figs. 1 and 2.—Traumatic deformity corrected by intranasal transposition of tissue and transplantation of rib growth.

practitioner for the purpose of correcting a saddle-back deformity, I found the ivory surrounded by cystic fluid which had been accumulating over a period of several months.

The introduction of foreign substances into the living tissues is against the teachings of biology and physiology. Such a practice is fraught with danger to the patient, with impermanency in results and with injury to the reputation of the surgeon.

Many years ago I demonstrated that bone and cartilage grafts removed from the patient's rib and transplanted into the tissues of the nose, for the purpose of correcting a depressed deformity, remained alive and continued to take part in the metabolism of the body.

Some of my oldest cases have been kept under observation, and from time to time x-ray films have been made. These films show, in patients operated upon many years ago, that the implant is alive, that it has grown (its growth being limited to the functional demands of the part), and that the deformity has remained corrected.

Despite these thoroughly established clinical facts in regard to the permanency of bone transplants, the value of my work was assailed by some, who, without personal clinical experience in the use of bone as a transplant, preferred, for reasons of their own, to adhere to the theory, long held by pathologists and others and copied from one treatise to another, that bone transplants were always absorbed. My conclusions, however, based as they are upon clinical results that have stood the test of time, are now established as facts that can no longer be questioned with the sincerity attributable to the scientific mind.

The matter of the permanency of bone transplants in the tissues is important, for there are some abnormal conditions to be found in the nose as well

Fig. 3. Fig. 4.

Figs. 3 and 4.—Saddle-back deformity due to injury in early childhood, corrected by intranasal transplantation of conjoined bone and cartilage.

as in other parts of the body that demand for their correction rigidity and the other distinctive attributes of bone.

I have always preferred to use a section of the patient's rib as a transplant for the following reasons: It is readily removed; the layer of compact bone is comparatively thin; the cancellous tissue, rich in osteoblasts, is abundant; the vascular supply is ample; and with a knife one may easily shape the graft to meet the requirements of the case.

Furthermore, the rib supplies the unique advantage of conjoined bone and cartilage. At the juncture of these two tissues the rib is thick and is composed chiefly of cancellous bone which may be easily shaped to supply the defect.

The removal of a section of the rib is attended by neither functional nor material loss, for the gap is quickly filled in with bone developed from the cut ends of the rib. Restitution is usually complete one year after the operation.

Successful transplantation is dependent upon the vitality of the graft, the physiologic integrity of the individual, the perfection of the operative technic and the judicious management of the case after operation.

In removing a section of conjoined bone and cartilage, I resect about two inches of the entire thickness of the rib, preserving the periosteum over the outer surface and shelling it out of its posterior covering. The perichondrium is carefully removed; this, if permitted to remain, would cause the cartilage to curl up. The entire segment, composed of two-thirds bone and one-third cartilage, is then split in its vertical diameter and the outer half is shaped to suit the deformity.

The graft is introduced through an incision in the roof of the nasal vestibule. Its upper end is mortised into the nasal process of the frontal bone, and its lower end may reach nearly to the tip of the nose.

The entire operation is done from within the nose and no visible scar results.

Fig. 5. Fig. 6.

Figs. 5 and 6.—Deformity due to submucous operation, corrected by transplantation of rib and transposition of intranasal tissues.

Complete protection and immobilization is afforded by a tin-lined copper splint which is applied over the entire nose.

Osseous union between the graft and the frontal bone and the upper surface of the nasal bones occurs in about two months. This supplies a firm bony bridge; while the cartilaginous end of the transplant supports the tip and does not destroy its resiliency.

The cartilaginous implant never establishes osseous union with the frontal or nasal bones; consequently a certain amount of motion always persists between the cartilage graft and the underlying tissues. It is for this reason chiefly that I prefer to use bone in restoring the bony bridge of the nose.

TECHNIC OF BONE AND CARTILAGE TRANSPLANTATION

Success in the transplantation of bone and cartilage is dependent upon a perfect technic; not only must the field be sterile, but the greatest care must be

taken to remove every trace of the chemical agents, such as iodine and alcohol, that may have been used in preparation for the operation.

After thorough sterilization of the field and all possible contacts, only sterile physiologic salt solution should be used during the entire operation.

USE OF CARTILAGE ALONE AS AN IMPLANT

As an implant, cartilage is regarded by many as superior to bone and is used exclusively by these men wherever a graft of any kind is needed.

I have always used both bone and cartilage, but believe that each has a distinctive advantage in its place, and that preference must be determined according to the nature of the defect to be corrected.

Cartilage, because of its consistency, has the advantage of being more easily shaped to suit the deformity. Furthermore, because it contains no blood vessels, being nourished only by intercellular circulation, it is unnecessary for it to be in contact with skeletal tissue. When used as an implant, it becomes incorporated by the surrounding tissues; from these it receives its nourishment.

Cartilage, when properly implanted, is never absorbed; its shape, size and consistency remain exactly as when it was introduced. These qualities make this tissue invaluable as a filler, especially in defects in the nose. Here its function is passive; cartilage can never be called upon to overcome active resistance, save when it is used in conjunction with bone, for it never establishes a firm osseous connection with bone, which is so necessary in order to provide a fixed point for leverage.

Implants composed entirely of cartilage should be used in the correction of minor defects in the contour of the nose. They may be used also in reconstruction of the cartilaginous portion of the nasal bridge in those cases where there is a firm basis upon which the implant may rest.

In conclusion, I shall say that the use of autogenous bone and cartilage implants is strictly in accordance with the rules of scientific surgery and that these tissues should always be used in supplying defects in the framework of the nose.

140 East Fifty-Fourth Street.

PREANESTHETIC MEDICATION

Barbiturates

George F. Seeman, D.D.S., Nashville, Tenn.

THE barbituric acid hypnotics act directly on the ganglion cells of the central nervous system, primarily on the higher nerve centers. As is well known, hypnotics and anesthetics act more on some groups of cells than on others. It is also equally as well known that these substances have a special affinity for the lipoid constituents of the ganglion cells. We know these substances are soluble in lipoids, and the extent to which this solubility exists has much to do with the rapidity with which they accumulate in the ganglion cells and with the degree of their action.

Reviewing the chemical names of these hypnotics will give you an idea of the manifold combinations which can be produced by starting with malonyl-urea (barbituric acid).

Barbital: ethyl-ethyl-barbituric acid.

Phenobarbital (luminal): phenyl-ethyl-barbituric acid.

Allonal: allyl-isopropyl-barbituric acid.

Dial: allyl-allyl-barbituric acid.

Neonal: butyl-athyl-barbituric acid.

Sodium amytal: sodium iso-amyl ethyl barbituric acid .

Amytal: iso-amyl-ethyl barbituric acid.

Ipral: calcium-ethyl-iso-propyl-barbituric acid.

1. Only about 25 per cent of the barbital is decomposed in the system, while the remaining 75 per cent is slowly eliminated during seven or eight days following the intake.

2. About 80 per cent of luminal is decomposed, but this decomposition proceeds very slowly for traces of the remaining 20 per cent are still present in the urine as late as the tenth day after intake, which explains *prolonged posthypnotic effect.*

3. Sodium amytal is rapidly and completely destroyed in body.

4. More than 80 per cent of allonal is decomposed in the system soon after intake and the rest is eliminated in less than twenty-four hours. No trace of the drug can be found in the urine later than on the second day, even after larger doses. Thus, the decomposition and elimination of allyl-isopropyl-barbituric account for the relative absence of prolonged hypnotic effects when therapeutic doses have been given.

The advantage of allyl-isopropyl-barbituric acid for premedicative use to the induction of anesthesia may be summarized as follows:

1. Rapid action.
2. Greater hypnotic action.
3. Greater margin of safety.
4. Rapid elimination.

These combinations all act as hypnotics, but this does not imply that they are of equal clinical value. In considering their therapeutic usefulness, one must take into account not only their hypnotic efficiency but also their liability to produce undesirable effects, which may be referred to as toxicity. This toxicity depends upon chemical structure, upon the amounts necessary to produce hypnotic action, upon the duration of such action, upon the rate oxidation and upon the rapidity of elimination. It is now an established fact that all these properties differ widely in these various barbituric combinations.

Actual figures for minimum effective doses, minimum fatal doses and the so-called "margins of safety" of various barbituric acid derivatives are given by Nielsen, Higgins and Spruth in *Journal of Pharmacology and Experimental Therapeutics* **26**: 379, 1926. The ratios are calculated on the basis of *one* for barbital.

BARBITURIC ACID DERIVATIVE	RATIO OF EFFECTIVENESS	RATIO OF TOXICITY	SAFETY MARGIN
Barbital	1	1	27
Luminal	2	2⅕	21
Allonal	4¼	2½	58

PANTOPON

Pantopon can be recommended with the utmost confidence because there have been hundreds of clinical reports, both here and abroad, attesting to the special advantage of pantopon over morphine in producing a smoother anesthesia.

As to the action of the alkaloids other than morphine, it should be noted that *narcotine* stimulates the respiratory center and in this respect is an antagonist to morphine, while *papaverine* smooth muscle and in this respect differs from morphine so that the effect of total opium is qualitatively different from that of morphine alone. Dose ⅓ grain.

ORTHODONTIC TREATMENT METHODS EMPLOYED BY THE WRITER*

GEORGE R. MOORE, D.D.S., M.S.
ANN ARBOR, MICHIGAN

HAVING started in the practice of orthodontics at a time when considerable change in attitude toward the treatment of orthodontic cases was in progress, I am, like many other men who have come into the field within the last ten years, dominated by this new method of approach to the whole problem of orthodontics. I think that an examination of all of the appliances I have used in the past eight years of practice would exhibit very effectively the application of these new principles insofar as it has been possible technically for me to adhere to them. I refer to the conviction among leaders in our profession that our problem is principally a problem of development. A large percentage of the cases we treat, which offer any obstacle to improvement, are themselves merely symptomatic of defective growth and development generally. Viewing the problem in this light, by far the majority of appliances used in my practice have been designed, from the very start, with the hope of stimulating development rather than straightening teeth.

My first instruction in this line of thought came during a year of postgraduate instruction under Dr. A. LeRoy Johnson at the University of Michigan. Under his guidance I first learned to understand the true place of appliances in any practice—as a means to an end and not the end in itself. Possessing this attitude, naturally I have been influenced more by the writings of such men as Hellman, Hatfield, Oliver, Mershon, Howard, Ketcham, Lourie, and others, concerning appliances, than by those writers who for years have been concerned with the more intricate so-called vise-like appliances.

It is my belief that appliances should fulfill the following requirements: simplicity of design, stability of anchorage, inconspicuousness, cleanliness, and, except in a few cases, a property which permits development of the supporting structures to progress without interference in any direction except in the direction of application of necessary stress.

As an example of the last point, let us consider hypothetically the effect of stimulating development in the maxillary lateral incisor region where we observe the lateral occluding lingually to the mandibular teeth. To treat this condition by using a band on the lateral incisor and any form of rigid attachment of this band to a body wire, either lingually or labially, would, in a measure, inhibit normal activity of osseous development of this region. Coming under appliances which might thus inhibit, one might mention the high labial wire when used with band and vertical tube, on the lateral; the low labial wire when used with a McCoy open tube adapted tightly to an 0.030 labial spring; the Angle ribbon

*Presented to the American Board of Orthodontia.

arch; the new Angle mechanism; and the pin and tube, among others. I do not want to infer that these appliances do not have their place in the practice of orthodontics. They do, but I do not feel that they can be used universally without much harm being done.

Using the high labial wire and applying stress to this lateral in such a way that development of osseous structure and tooth movement would be permitted to go on in all other directions according to natural developmental processes have seemed to me to be much more desirable. It is also possible to use the McCoy open tube in a similar way. In fact, most appliances lend themselves quite readily to either plan of treatment.

In my practice rigid attachments are avoided wherever possible. This is said with the full realization of the fact that such attachments and such manipulation cannot be universally avoided. I have used in the past, am now using, and will undoubtedly continue to use rigid attachments in certain types of cases.

In my opinion, the hypothetical case of the lateral incisor above mentioned would respond much more satisfactorily, considering the development of the region, under the stress of very light springs attached to a lingual wire, this lingual wire in turn being supported in the molar region by means of attachments permitting freedom of masticatory movement of the anchor teeth in every possible direction. In the effort to make such an ideal possible I am inclined to use the simple lingual wire with attachments, as advocated by Mershon and Oliver, eliminating wherever possible the use of the vertical half-round tubes and shafts on both sides and using them on one side instead. On the other side, wherever practicable, I favor the use of horizontal round closed-end tubes to fit the body wire. On the mandibular arch I find this principle of attachment much more difficult to adhere to and still not be obliged to recement bands at every sitting. A maxillary lingual wire constructed according to this design does not often cause much trouble in removing. I have experienced such success in the treatment of crossed-bites with this wire, using vertical half-round tubes and shafts on the relatively normal side of the maxillary arch and horizontal round tubes on the crossed side, that its use for this type of case has become practically routine in my practice. Wherever practicable in the treatment of cases, all other requirements of the appliances having been considered, I like to use the vertical half-round tube and shaft in the maxillary arch on one side and in the mandibular arch on the other side, using the horizontal round tube on the opposite side in each case. I realize that this is possible in less than half of the cases, but, wherever it is possible, much of the traumatic relationship between maxillary and mandibular molars, attending the use of vertical half-round attachments all around, is eliminated.

From the foregoing it is possible to ascertain what the attitude of my practice has been toward the manipulation of the various types of appliances in general. Considering the amount of spring stress which it is my custom to apply in the stimulation of tooth movement, I may say that I have changed very little over the last few years. I started out with a theoretic understanding of the logic in the statement that very light forces more effectively stimulate development than relatively heavy forces. At first it was difficult to keep from ap-

plying heavy forces in spite of this understanding, and occasionally I would find myself adding stress until exorbitant forces were being used. Even then, I can safely say that I have never been guilty of using appliances resembling crowbars in either appearance or action.

For auxiliary springs I use precious metal wires of 0.022, 0.020, 0.018 and 0.016 diameters, never employing 0.022 excepting for extensions from high labial wires, lingual locks, and either very long simple springs or relatively long reflexes. My first thought in the construction of any spring is, "Can I make use of 0.016 wire for this spring?" Frequently an active tongue, a child careless in the cleaning of his appliances, or other factors militate against the use of fine spring wire in the construction of springs with appreciable length. In general, I use the finest spring wire possible, and, if I should fail with wire of one dimension, I seldom increase it more than two thousandths of an inch in diameter when I replace it. The shorter the spring, the smaller is the diameter of the wire.

In this connection, just within the last few months I have begun to wonder whether or not we are really accomplishing the purpose we desire when, for example, we use recurved springs for the mass movement labially of the mandibular four anteriors. With this thought in mind I have constructed springs of all practical diameters, lengths, and designs used in the mouth, and, with a special precision set-up which I shall report in a subsequent paper, I have been testing the amounts of stress at various points on the spring wire necessary to produce given amounts of displacement previously determined. I started out with perfectly simple springs 3 cm. long and studied amounts of stress at the 3 cm. point, the 2 cm. point, and the 1 cm. point which, when applied, would displace the spring at that point, first 1 mm., then 2 mm. After I had collected considerable data in connection with this problem for 0.018, 0.020, 0.022, and 0.030 wire from two or three of the gold supply houses, I began designing a similar set-up to test reflexes. This was done in much the same way at the 3 cm., 2 cm., and 1 cm. points as above described. Now I am designing a set-up by which I hope to be able to measure the varying amounts of stress, applied simultaneously at three or four different points on a wire (comparable to the mandibular four anteriors, for example), which will produce first 1 mm., then 2 mm., displacement along the whole distal limb of the reflex spring.

By this method of investigation of stresses one should be able to determine the amount of stress delivered by a reflex spring designed to stimulate development of the mandibular four anteriors, on each of the several points of contact. Undoubtedly, springs of this type deliver considerably more stress on one tooth than they do on another. The tooth in contact with the spring at the curve will undoubtedly receive a different stress if it is acted upon in combination with another tooth. The same supposition holds in the case of a tooth in contact with the extreme end of a reflex spring of this type.

I do not want to convey the impression that this work is being done without a full realization of the fact that changes in the amounts of stress will take place from day to day as the effects of spring stimulus progress. Work of this kind, however, must be carried on from simple beginnings, and the complex conditions

presented by the physiology of the mouth and oral tissues can be simulated only after relatively elementary problems are solved. If our investigations should prove that there are wide differences in amounts of stress applied to the various teeth under joint influence of a spring, then our attention will be turned to variations in design to eliminate these adverse possibilities.

In order that the reader may be better able to examine my treatment methods, I shall outline the methods most commonly adhered to in the management of the several types of orthodontic cases. As before intimated, I am inclined to favor methods of treatment which employ a stimulating appliance rather than an appliance designed to move teeth bodily. I realize that both methods are indicated in any practice. Their use is dependent upon the type of malocclusion, its degree of severity, the age of the patient, and the purpose in the mind of the operator.

In keeping with the present day attitude of service, perfection of tooth alignment and root inclination are not necessarily the goal in the treatment of all cases. In fact, a very large percentage of the cases treated in my practice are started with quite a different object in view, namely, an improvement of the conditions first presenting to a point where the patient's condition falls within the limits of normality. Many of my cases so treated have required a surprisingly short duration of active treatment, and have continued to improve many months and sometimes years after the removal of appliances. I believe that this attitude toward orthodontic practice is very much in keeping with advances now being made by all branches of the medical profession in the effort to diminish the need for extensive health service, and, in that way to diminish its cost. I have found the effects of this practice very satisfying indeed in a community well educated along health lines, and I believe that the thinking people of this community are each year more willing to accept the fact that orthodontics is truly an indispensable part of general health service.

To return to the subject of treatment of specific cases, I have found the removable lingual wire an indispensable appliance, used at some time in the treatment of practically every case. Inasmuch as root movement is seldom considered a necessity in the premolar and molar regions, I am well satisfied with the use of the lingual wire as a means of stimulating lateral expansion of the maxillary or mandibular arches. In cases of deep overbite with normal anteroposterior relationship of arches, I use the lingual wire not only for the expansion above mentioned but for the elongation of arches anteroposteriorly, with the full realization that, except under very careful supervision, one is likely to induce slight tipping of the molars in a posterior direction at their crowns. Every year I am becoming more adept at the elimination of this adverse effect, but I consider this effect of treatment in deep overbite cases less deleterious than in cases presenting end-to-end bite, open-bite, or a normal degree of overbite. In these two latter types I never use the lingual wire and finger springs for anteroposterior elongation of arches without banding those anteriors upon which the springs act and allowing the springs to lie cervically to spurs upon the lingual surfaces of such bands. In conjunction with the lingual wire I sometimes use

bands on premolars, canines, or incisors, on whose lingual surfaces are attached 0.022 tubes in which tiny reflexes attached to the lingual wire act in such a way as to produce rotation or other root movements. If these so-called "finishing touches" cannot be produced in my hands by means of the lingual wire, I resort to the use of a high labial wire with extensions in combination with the lingual wire, according to Lourie; or a low labial wire with labial springs attached to either bands or wire.

I do not resort routinely, however, to any appliances commonly used for radical movement of roots, since I believe that our possibilities of stimulating bone growth by means of orthodontic appliances alone are extremely limited. In a conversation some years ago with Dr. J. V. Mershon, I was interested to hear him express an opinion that seemed to me very logical. It was in effect as follows: "If anterior teeth moved bodily continue to remain in their new positions, they would have just as certainly and more satisfactorily reached those positions through the effects of functional stress, and without the need of appliances."

In addition to the high labial according to Lourie and the low labial according to Jackson, I sometimes use the low labial wire with labial springs running through McCoy open tubes. I find that by ligating springs rather than the body wire itself to the McCoy open tubes I am able to deliver light stresses in the rotation of teeth much more effectively. The above remarks pertaining to the finishing of neutroclusion cases apply as well to the finishing of posteroclusion and anteroclusion cases after change in relationship of the arches has been accomplished.

In the treatment of posteroclusion cases it has been my custom to begin by eliminating interferences present in the maxillary arch, by reason of position of individual teeth. Such conditions as retruded maxillary anteriors, rotated maxillary canines, lingually posed maxillary premolars or molars, or general constriction of maxillary arch, interfere by prohibiting the mandibular arch from assuming a normal anteroposterior relationship to the maxillary arch. This I consider the most important step in treatment of posteroclusion cases, and I determine any success in accomplishing the removal of interferences by referring to frequent study casts. I continue to remove interferences in this way until I can occlude these casts relatively normally and then proceed to attempt changes in arch relationship by means of intermaxillary elastics or inclined planes, if I have not already started to do so during the time I was removing interferences. If the case is of such nature that the use of intermaxillary elastics tends either to maintain an already elongated condition of anteriors or to further elongate them, I immediately resort to the use of a lingual wire with inclined planes carefully adjusted to the lingual surfaces of maxillary incisors, far enough incisally to hold the bite open, and in this way stimulate intrusion of both maxillary and mandibular incisors. This effect is accomplished not only through the influence of the bite but also through the influence of the stress of the labial wire activated by rubber elastics. In these cases the maxillary incisor teeth are intruded by reason of the wedge shape of their crowns in longitudinal sagittal section, lying between labial wire and lingual planes.

In the treatment of unilateral posteroclusion cases I follow one of two methods. First, according to Mershon, I sometimes band the mandibular first permanent molar on the side in posterior relation, and, with the aid of intermaxillary elastics on that side only, I attempt to change the relationship in spite of the possibility of rotating the molar. I then adjust a simple mandibular lingual wire with which I proceed to rotate the molar in its newly assumed anterior position, and, with the aid of springs of various types, stimulate the development of and improve alignment in other regions of the mandibular arch. The second method which I have found very satisfactory in several cases consists of the use of a three-sectioned mandibular lingual wire jointed in both canine regions by means of vertical round tubes and shafts at these points. This permits change in a forward direction by the influence of intermaxillary elastics on one side independently of the other.

Although I realize the extreme difference in the anatomic nature of posteroclusions of the so-called Class II, division 1, and Class II, division 2 (Angle) types, I treat them mechanically in much the same way in young individuals. My object is to change the relationship of arches and, while maintaining the new relationship, to depend on subsequent adjustment of facial structures to work out the ultimate result. In other words, in young patients I feel that overenthusiasm in the effort to retrude a whole maxillary arch in the so-called Class II, division 2 case is eminently superfluous, and in adult patients or late adolescents it is unreasonable to expect changes hoped for in the developing case. I would rather resort to extraction of two maxillary premolars than to attempt unsuccessfully to retrude a whole maxillary arch.

I have seen, however, strikingly successful results in these Class II, division 2 cases treated by the removal of interferences in the maxillary arch, with subsequent use of inclined planes as so-called working retainers over a long period of time. At the end of this time several of these cases in my hands have assumed the new relationship with no possibility of mandibular retrusion and with apparently permanent change in relationship. Although I am sufficiently certain that changes in adjustment have come about in the bones of the face, I have no scientific evidence supporting this belief, and I do not know what has really happened.

In the treatment of the few anteroclusion cases which have appeared in my practice I have used the above described appliances reversed in opposing arches, that is, maxillary lingual and mandibular labial with intermaxillary elastics. Where the overbite presents possibilities of being deep, I seldom resort to the use of a labial wire on the maxillary arch. But in those cases where the bite is end-to-end or nearly open to begin with, I modify my treatment by the use of labial wire on both arches. In conjunction with the maxillary labial wire, I sometimes band the anteriors and allow the wire to rest above spurs on these bands, using three-way intermaxillary elastics in order to prevent further opening of the bite or to produce closure of the bite during treatment. These cases of open-bite in conjunction with anteroclusion have been less satisfactory in my practice. I think this is because cases of this type are usually manifestations of rather deep-seated growth disturbances in the face.

For this reason, I am very cautious in my prognosis of these cases when discussing them with parents. I might say that whenever cases of this kind present at an early age and radiographs show the presence of mandibular third molars, I have no hesitation in advising the surgical removal of these third molars in their crypts. I do this in order to remove any maleffects they may be exerting upon the development of the mandible, although I realize that there is no proof that third molars do have the influence intimated. Particularly do I think that they should be removed in similar cases where maxillary third molars are congenitally absent.

In concluding, it is my hope that the foregoing may serve to define satisfactorily merely an attitude toward appliances in the practice of orthodontics. To continue on and on with details of manipulation would be superfluous and never up-to-date. Every day some practice long adhered to is dropped and a new idea takes its place. If I change my methods as much in the next ten years as I have in the last eight, I shall look back upon this report as quite obsolete—and, in the interest of progress, I hope I do.

RESORPTION DUE TO IMPACTED CANINE*

Case Report

Richard H. Stucklen, D.M.D., Wilmington, Del.

THE patient, a girl of thirteen years, was placed under orthodontic treatment in December, 1929.

An occlusal view of the maxillary arch shows the right lateral incisor in contact with the first premolar. Directing the x-rays down through the cranium parallel to the long axes of the incisor roots, an occlusal radiograph was produced. The shadow of the canine fell lingually to the lateral incisor, occupying the space between the right incisors and first premolar, overlapping the incisors to some extent. (Fig. 1.) Unfortunately, such a radiograph could not be reproduced.

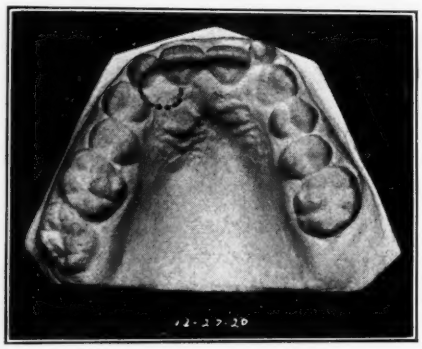

Fig. 1.

A routine radiograph of the incisor region again reveals the unerupted canine. (Fig. 2.) The tooth was apparently impacted, according to Anthony's definition, that is, it was "wedged in; firmly lodged." Another radiograph of the incisor region taken a year later, together with the first, shows a peculiar radiolucent area on the right central incisor. (Fig. 3.) Incidentally, the left central incisor root appears to be quite short. The root of the lateral incisor is shadowed, for the most part, by the canine.

Casts made a few months later show the increase in the size of the arch, and the canine erupting naturally, lingually to the lateral incisor. (Fig. 4.)

In October, 1931, although the appliance did not come in contact with the lateral incisor and there was no pain, the tooth became loose and there was some recession of the distal gingival margin. At this time, another radiograph was taken, which showed a marked radiolucent area on the roots of both incisors. (Fig. 5.) This led to numerous other radiographs, the clearest of

*Read before the New York Society of Orthodontists, November 15, 1932.

which was taken from the lingual aspect, the following February. (Fig. 6.) Several others taken in April show this area quite distinctly. (Fig. 7.)

Fig. 2. Fig. 3.

Fig. 4.

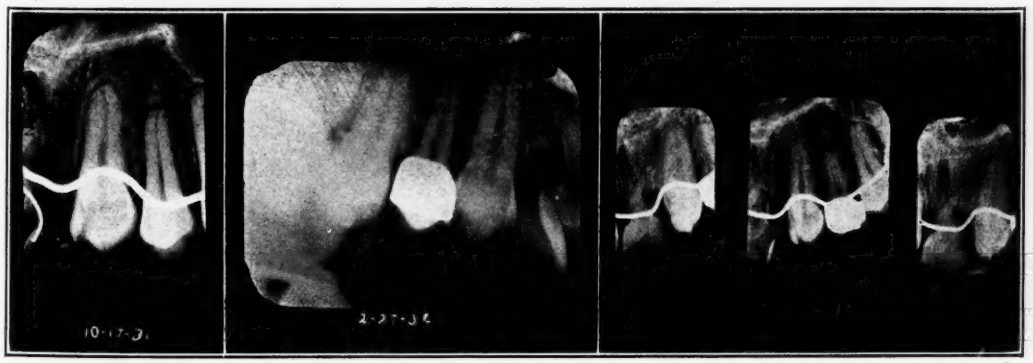

Fig. 5. Fig. 6. Fig. 7.

At that time I conferred with Dr. L. M. Waugh who diagnosed the case as pressure resorption.

A cast made in June, 1932, shows the position of the teeth just before the lateral incisor was extracted. (Fig. 8.)

The extracted tooth verifies Dr. Waugh's opinion. Its root appears as if it had been split longitudinally in the labiolingual plane and the lingual section lost. (Fig. 9.) There was a granulomatous mass lingually between the maxillary right lateral and central incisors, where apparently the crown of the erupting canine had been. A small quantity of pus exuded from that area when an explorer was passed up along the resorbed roots, although the gum appeared perfectly normal. The central incisor appeared much as had been expected, according to the radiographs. Its root had a huge cavity at the distolingual angle, extending from the cervix midway to the apex and to a

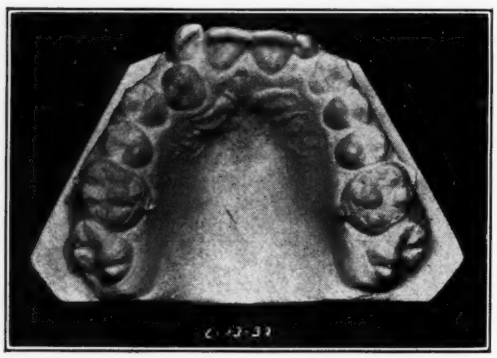

Fig. 8.

Fig. 9.

Fig. 10.

depth practically to the root canal. This cavity also appeared to be cleanly hollowed out, and strangely, its apical floor, in contrast to the lateral incisor, was quite flat and at almost a right angle to the long axis of the tooth. The extraction of the lateral incisor allowed some access for a porcelain inlay to be inserted in this cavity. (Fig. 10.)

This case proves the possibility of an impacted maxillary canine's causing severe damage to the roots of neighboring teeth. It also shows the necessity for thorough radiographic diagnosis at the beginning of orthodontic treatment.

The case records, including the extracted lateral incisor, are to be placed in the museum of the Department of Orthodontia, Columbia University.

DENTAL HEALTH SURVEY

PROPOSED OUTLINE OF ORGANIZATION WHEN THE SURVEY IS TO BE MADE BY THE STATE DENTAL SOCIETY THROUGH OFFICERS OF THE STATE SOCIETY, CHAIRMAN OF THE STATE ORAL HYGIENE COMMITTEE OR DIRECTOR OF DENTAL HEALTH SERVICE OF THE STATE BOARD OF HEALTH

This plan of organization can only be used in states where the dental society is well organized and where the state officers are willing to take the responsibility of the entire survey in their jurisdiction.

1. The state society officers should designate some officer of the society such as the state secretary, chairman of the mouth hygiene committee, the director of dental activities of state department of health, or some such person or committee to supervise and direct the survey throughout the state.

2. The first step should be the publication of articles in state bulletins informing the profession of the project and urging support and participation of all component and local societies. Also progress reports should be published in subsequent issues. (The Committee for Dental Health Survey will be glad to furnish material for publication.)

3. The state officers should, as soon as possible, secure endorsements of this program from the commissioners of the state departments of health and education. The survey already has the endorsement of the Association of State and Provincial Health Authorities, of which organization every state health commissioner is a member. The following resolution was passed at their last annual meeting June, 1933.

"That the Committee of State Provincial Health Authorities approve the dental health survey as proposed to the Public Health Service and that it cooperate with the American Dental Association and the U. S. Public Health Service to the fullest extent in carrying out the study."

A copy of the above resolution, together with the endorsements from the commissioners of health and education, should be forwarded to component or local societies to assist them in their contacts with local health and educational officials.

4. The officer or committee selected for state organization and supervision of this survey should communicate with component or district officers to determine immediately whether or not they will participate in this study. In order that the component or district officers may know the extent and purpose of this survey the following information should be enclosed:

a. Circular No. B-171.
b. Circular No. B-171a (Proposed Outline of Organization for State and Component Societies).
c. Circular No. B-181a (Instructions to Local Societies).
d. Examination Blank.
e. Circular No. B-181 (Instructions for Recording Examination).

The above circulars and forms will be supplied to the designated state officer upon request, or, if preferred, these circulars and forms will be mailed direct to the secretary of the component or district societies upon receipt of their names and addresses. However, the ideal arrangement would be for the state society to take full charge of the survey within its jurisdiction. All forms and circulars will be supplied and should be distributed by the supervising state agency.

5. When a district society has signified its willingness to participate in this study, it should be instructed to set up an organization similar to that of the state society. It in turn should solicit the cooperation of city, county or local societies and assist them to interest and organize the individual groups of dentists, who will make the examinations. They should furnish the local societies with copies of endorsements from the State Commissioner of Health and Education, as well as from the Association of State and Provincial Health Authorities. In selecting local groups to make this survey, they should keep in mind the necessity for obtaining a cross-section of all classes living within the district.

6. In case the state is not organized in districts, it will be necessary for the state officer or committee to organize the city, county, local societies or rural areas direct.

DEPARTMENT OF
DENTISTRY FOR CHILDREN

HOW TO PRACTICE DENTISTRY FOR CHILDREN AS PREVENTIVE ORTHODONTICS*

HERBERT R. FOSTER, M.S., D.D.S., OAKLAND, CALIF.

THE goal of all branches of medicine is probably what is called optimum health. This too should be the goal of dentistry. Because the condition of optimum health is somewhat abstract, many of us do our small part of eradicating the dental infection and leave the rest to the physician. If we have no other goal, we are liable to choose the acquiring of money as our next more concrete aim. It is true that under present economic conditions we do need money to live, but it will not bring happiness by itself. The practicing of dentistry for the single purpose of making money will take the joy out of dentistry, and dentistry will become a drudgery instead of a fascinating occupation.

The goal that has kept me interested in dentistry is the goal of ideal occlusion. This ideal occlusion is the job of the dentist as well as of the orthodontist. What good is it for an orthodontist to bring about normal occlusion if the patient loses a tooth because of dental caries and ensuing infection? It is a dentist's job to keep the denture normal after the orthodontist has made it so.

How much better would it be if the dentist could have prevented the malocclusion in the first place. There is real joy in filling a deciduous tooth when you realize that it is because of your filling that the succeeding permanent tooth will have enough space to take its normal place in the dental apparatus. What a thrill it is to detect a maxillary central incisor tending to lock to the lingual of the mandibular central incisor as their incisal edges near each other. Here is your golden opportunity to have the patient bite on a wooden tongue blade ten minutes twice a day. When after a few weeks you see that maxillary central incisor biting to the labial of the mandibular central incisor, you experience a glow of satisfaction because you know that you are the one who made possible the normal occlusion, that is your goal.

When we grasp the complete picture of what brings teeth into their normal position and what forces hold them there, we shall be better able to detect variations earlier and better able to discover and eliminate the causes of malocclusion. I should like to present a picture of a few of these forces and show how they should balance each other in normal occlusion.

*Read before the Section on Dentistry for Children, California State Dental Association, San Francisco, April 22, 1933.

We know the tongue exerts an outward force on the lingual surfaces of all of the teeth. Because teeth are imbedded in bone which is living tissue and will respond to pressure according to Wolf's law,[11] these maxillary and mandibular teeth would move buccally or labially unless there were some force to offset this outward pressure of the tongue. The cheeks rest against the buccal surfaces of the posterior teeth and the lips against the labial surfaces of the teeth. If the force of the cheeks and lips equals the force of the tongue, there is a balance of forces and the teeth remain in the position occupied at that time. If one of these forces is increased or diminished without a corresponding change in the opposing force, the teeth will move away from the greater pressure until balance is established again, with a resulting malocclusion and its accompanying evils.

If a person sleeps on his abdomen, he must turn his head to breathe; and if the weight of the head is taken on the lower half of the face, he immediately upsets this balance of forces, and the maxillary dental arch will become narrow because the mandible being movable may be pushed away and receive little pressure. This will cause the well-known cross bite which will not correct itself. Suppose a three-year-old child is brought to you to have his teeth cleaned and you see a tendency toward a cross bite, here is a chance to establish the ideal of normal occlusion by eliminating the faulty habit before the cusps are locked in the cross bite. You may believe that it is the orthodontist's responsibility to find the cause and correct the fault but it is the dentist's privilege and opportunity to detect the beginning malocclusion. You must keep that ideal of normal occlusion in mind with every patient or you will miss these wonderful opportunities. Look for ideal normal occlusion in every child's mouth, and you will find this ideal or the opportunity to bring it about.

What can the mother do to correct the faulty sleeping posture? For the infant there are certain sleeping harnesses. One part of the harness is tied to the sides of the crib, and the other part is pinned over the child's shoulders and body. There is an attachment between the two parts which permits the child to roll from side to side but restrains him from rolling on his abdomen. For the older child or adult who wishes aid in breaking himself of this abdominal sleeping habit, a simple harness can be made of discarded ties. Make a loop at one end of each of two ties and slip one loop over the right hand and one over the left, and put them up to the shoulders. Hold these loops up over the shoulders by means of a third tie across the shoulder blades and through each loop. The ends of the first two ties are pinned to the sides of the mattress. This gives the necessary restraint to prevent turning over on the abdomen while asleep. Another aid that may be tried is to sew two or three rows of golf balls or blocks vertically down the front of the child's sleepers. One of the latest methods to keep adults on their backs is to sleep on a board covered with several blankets. It is much more comfortable to sleep on one's back on a hard board than to be on one's abdomen. Any of these aids may be used, but what works successfully for one person may not work for another.

The question has been raised that a person does not lie in one position long enough to cause any such deformities. Harvey Stallard,[6] of San Diego,

who has probably done the most work on the problem of sleeping postures and their relation to malocclusion found that anywhere from three or four to ten pounds or more pressure can be placed on the face in faulty sleeping postures. He also says[7] that during the first year of life the child reclines 90 per cent of the time, the second and third years 75 per cent, from the fourth to the twelfth years 64 per cent, and from twelve to twenty he reclines 40 to 50 per cent of the time. When a postman can acquire spinal deformities in a few hours' work a day because of the weight of a mail pouch, you can understand how a child's denture can be deformed by faulty sleeping postures because of its delicacy and instability. Stallard[6] paints a vivid accurate picture of this plasticity of a child's denture, "The infant denture is the terminal bud of the head, undeveloped but its parts laid down ready for unfoldment and for twenty years or more grows downward, forward, and outward, the critical period beginning after the back and base of the cranium stop rapid growth. The baby, at birth as immature as a four months' horse fetus, helpless and tender, incapable of changing its position, sleeping from twenty to twenty-two out of every twenty-four hours during the first three months, must be turned to prevent its lying habitually on one side, which would deform its body and derange its organs. It is usually six months old before any teeth erupt; its mandible, unsupported by molars for thirty months, receives stronger intermaxillary support at six, but during the next four years, while the succedaneous teeth are erupting, the anterior parts of both jaws lack full dental support. Deciduous molars, few in number, with shallow fossae and dull cusps, if used, wear down rapidly and their roots begin to be resorbed the fourth year after eruption, lessening the intermaxillary support during this transitional period. Man has proportionately shorter cusps and shallower fossae in his permanent teeth than many other related animals. All his teeth may be deflected in any direction before locking in occlusion, or during the three years following since they are immaturely anchored until root development is complete, but even though they offer more resistance after that, nevertheless they may be displaced in the same directions by constant forces."

Some have questioned the general prevalence of these deformities, caused by faulty sleeping postures, and Stallard[8] estimated by studying orthodontists' cast collections and examination of school children or other groups that 15 to 20 per cent of Californians are so affected.

Among the undesirable habits that children have which have been accused of causing malocclusion are, thumb-sucking, finger-sucking, nail-biting, tongue-sucking, lip-sucking, lip-biting and grinding of the teeth. Textbooks show a wide variance of opinion as to the effect of these undesirable habits on the teeth and dental arches and give little in the way of sound evidence to support these opinions. Probably the most scientific work along this line is that of Samuel J. Lewis,[3] of Detroit, who started in 1924 to observe the growth changes of teeth and dental arches of a group of preschool children in the Merrill-Palmer School in Detroit. An enlarged program was made possible by a grant from the Children's Fund of Michigan and he is now studying habits influencing deciduous dentition on the basis of first-hand observation of a group of children from birth to sixteen years of age. These

studies include recording the eruption of deciduous teeth, x-ray pictures, and the making of models of the teeth once a year and many other details. Lewis found evidence that thumb-sucking causes a typical malocclusion in the deciduous denture and that in all cases in which the thumb-sucking habit was broken by the fifth year of age, the malformation corrected itself without the aid of appliances. He urges that a reasonable procedure in treating cases of malocclusion complicated by such a habit as thumb-sucking is to correct the habit first and then give the malocclusion time to correct itself. Lewis also found that though mechanical methods of treating such habits as thumb-sucking may be useful in certain cases, especially with young children, psychologic measures were found more successful with the present group of children. Lewis is doing a wonderful work and I advise every dentist to read his writings or hear him speak if given the opportunity.

In breaking a child of thumb-sucking, what will be successful in one case will not always succeed in another. Among the mechanical methods of curing thumb-sucking are thumb guards, elbow cuffs, hand mitts, jackets and sleeping bags. For the newborn baby the sleeveless jacket or tying the sleeve so that the hands cannot get out are both effective. Thumb guards are effective unless the child is persistent and removes the guards. Hand mitts, usually made of aluminum, are very effective, as the child cannot get his fingers out to untie the tape holding the mitts on. Hand mitts should not be used during the daytime when the child is learning to use his fingers, as this phase of his development may be retarded. Elbow cuffs made of heavy cardboard or wooden tongue depressors placed in pockets sewn in the sleeves of the child's night garment have also been successful in some cases. Among the psychologic methods more effective in older children is the appeal to the will power or pride. The most striking instance in my practice was the immediate cessation of the habit in a four-year-old boy after I had shown him in a hand mirror how his thumb fitted into the space caused by the thumb-sucking and then I showed him the models of an older child who had a severe malocclusion caused by thumb-sucking. That four-year-old did not want crooked teeth like that, and he has never sucked his thumb since, although that was two years ago. Lewis[2] has been successful with a method ascribed to Dunlap of Johns Hopkins University. The principle of this method is breaking the child of the habit by making him conscious of it. The child is taken from his play twice a day and made to suck his thumb for ten minutes before a mirror, until the habit is broken.

Lyons[4] found in an examination of 5000 school children that 65 per cent of the malocclusion noted was associated with early or premature extraction of teeth with no attempt to retain the space. From my observations in children's dentistry I believe that over 90 per cent of these premature extractions were the result of dental caries. To me the saving of deciduous teeth is the most practical and ideal preventive orthodontics and something that every dentist can do. When you find a cavity in a deciduous tooth, it is your opportunity to save that space for the succeeding permanent tooth. If you neglect to fill that tooth properly, you are sentencing the child to a malocclusion because you know that the dental caries is going to disintegrate the

crown of the tooth so that the mesiodistal diameter of the crown will be lessened and eventually the crown be lost completely. You know that as soon as that natural space retainer is shortened by caries or lost completely by disintegration or extraction, the tooth to the distal of that space is going to tip and move mesially and eventually will close the space. In this case the succeeding permanent tooth has to remain in the alveolar process or only partially erupted as an impacted tooth. It cannot take its normal position in the arch, and the beauty and balance of a correctly articulated denture are lost. Any one who is mechanically minded cannot help but look on a normal denture as a perfectly balanced set of gears with each cusp interdigitating between certain cusps in the opposite jaw and every groove designed to receive a cusp so that the whole dental apparatus stands as a monument to the great intelligence of the Creator who made it. To realize that one small, properly placed filling will save the beauty and majesty of this monument should make every dentist realize that dentistry has a very vital part to play in this world.

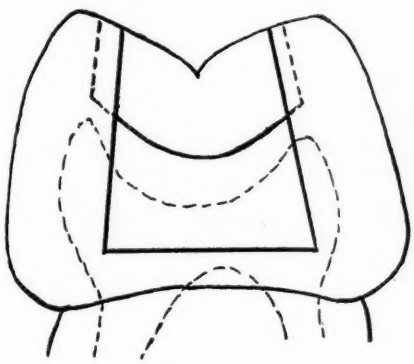

Fig. 1.

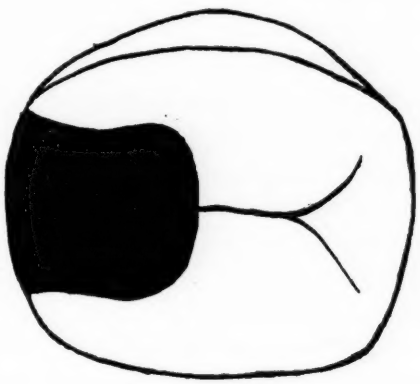

Fig. 2.

Fig. 1.—Proximal view of cavity outline showing how to avoid exposing pulpal horns and yet give bulk to occlusal step.

Fig. 2.—Occlusal view of proximal filling in deciduous tooth showing wide neck of occlusal dovetail.

The realization of this responsibility should make every dentist eager to learn how to place the best fillings possible in deciduous teeth so that the decay will be checked, infection prevented, and the mesiodistal diameter of the tooth saved for the permanent tooth to follow.

Do not depend upon the adhesiveness of filling material to hold fillings in deciduous teeth but cut the cavities so that the fillings are mechanically locked in the cavities by undercuts, parallel walls and dovetails in the occlusal step of proximal cavities. These occlusal steps must be shallow over the buccal and lingual pulpal horns and deep in the center to give bulk to the filling material. Proximal fillings in deciduous molars fail not because of lack of dovetail on the occlusal step but because the neck of the dovetail reduces the bulk of filling material and is the weakest point of the filling. The merest suggestion of a dovetail is sufficient for retention, but there must be a large bulk of material at the neck of this dovetail, and this is accomplished by widening the neck and deepening the cavity in the center of this dovetail.

Do not use silver nitrate to inhibit the action of decay remaining in the cavity, but clean out every bit of soft decay even if it means exposing the pulp, because any decay left under a filling will cause death to the pulp. Do not put in cement fillings because those deciduous molars must be kept until ten, eleven or twelve years of age, and no cement filling will last until that time. Copper amalgam has not been successful in my practice. Use a high grade of silver amalgam, and use just as much care in the cavity preparation, removal of decay, mixing of filling, placing the matrix, and condensation of the filling as you would for a permanent tooth. Think of the ideal occlusion, and remember that you are saving the space for the permanent tooth, and that the filling in the deciduous tooth must be so placed that it will last until that deciduous tooth is lost and the naturally succeeding permanent tooth is ready to take its place in the line of occlusion. Remove all the decay from a cavity even though you expose the pulp. What do you use to cap an exposed deciduous pulp? is no doubt the question you will ask now. My answer is, Do not cap an exposed deciduous pulp. I have not been successful in capping these exposed pulps in deciduous teeth. They invariably die and become putrescent. The parent loses faith in your ability to do dentistry for children, and the putrescence may make it necessary to extract the tooth. This brings up that bugbear of dentistry, root canal work.

I believe the majority of practicing dentists are opposed to devitalized teeth and rightly so. Before you extract a devitalized deciduous tooth, however, consider the following conditions: (1) The root ends of deciduous teeth are constantly being absorbed to make room for the permanent teeth; thus the imperfect apical end of the root canal filling is made more perfect. (2) The average child has greater recuperative powers than an adult and probably can combat any such infection better. (3) The devitalized deciduous tooth is going to be retained in the mouth not more than six years at the longest and many for only a year or two depending upon the age of the patient when the pulp is devitalized. (4) No space retainer is as satisfactory as a deciduous tooth to hold the space for the succeeding permanent tooth. (5) Last but most convincing to me is the fact that after ten years of doing root canal work on deciduous teeth in patients most of whom were under close supervision of pediatricians, I have had but one case where I felt a devitalized deciduous tooth might have been the primary focus of infection in that child's ailment.

Next to properly filling a cavity in a deciduous tooth before the pulp is exposed, I feel that the saving of even devitalized deciduous teeth as natural space retainers is ideal preventive orthodontics.

The procedure in treating exposed pulps in deciduous teeth is as follows: Dip a small devitalizing wafer containing arsenic and novocain in phenol and place over the exposure. Seal with gutta percha from twenty-four to forty-eight hours. At the second appointment, remove the devitalizing wafer and seal a pellet of cotton containing formocresol over the exposure. Leave this in at least twenty-four hours and not longer than one week. At the third appointment, keeping the tooth dry with cotton rolls, remove the top of the pulp chamber so that you have good access to all root canal openings. With a

spoon excavator remove the pulp from the pulp chamber and seal in another treatment of formocresol. At the fourth appointment, remove the toughened mummified pulp tissue from the occlusal part of the root canals with a fine explorer but do *not* broach to the end of the canals. Absorption of deciduous roots usually takes place on the distal side of the mesial root, and mesial side of the distal root. Thus your deciduous roots may be full length, but the apical opening of the root canals may be one-third to one-half the way toward the crown from the end of the root. Any broaching to the root end would just irritate and lacerate normal tissue. Use as a root canal filling a thick creamy mix of zinc oxide and eugenol with a small crystal of silver nitrate to give permanent germicidal property to the root canal filling. Work the filling down the canals with an explorer point, fill the chamber and use a cotton pellet as a plunger, attempting to push the filling to the ends of the root canals. Seal with a cement step, place the amalgam filling in the cavity, and you have a space retainer that will not give you any worries. I prefer formocresol as a sterilizing agent because it tans, toughens or mummifies the pulp tissue, preventing hemorrhage and often making it possible to remove the entire contents of a root canal in one piece because of this leathery condition. Any pulp tissue left at the apical end of the canal is mummified and apparently does no harm.

Putrescent deciduous teeth are treated similarly except that a sterilizing treatment of formocresol is substituted for the devitalizing treatment and the pulp chamber is opened and the débris cleaned out at the first sitting. This makes three formocresol treatments before filling the root canals at the fourth sitting. The success in treating putrescent deciduous teeth depends upon proper selection of favorable teeth to treat. The following three conditions contraindicate treatment, and extraction is indicated.

1. If the deciduous roots are more than two-thirds absorbed, treatment will be a failure.

2. If the pus has torn away the attachment of the peridental membrane so that the pus is discharging at the free margin of the gum around the neck of the tooth, reattachment will not take place and infection will regain entrance to the apical tissues.

3. If the caries has punctured the bifurcation of the roots, extraction is indicated.

Fistulas persisting after treatment and filling should be removed by curetting between the roots with a spoon excavator or given the rosehead bur treatment described in detail by Chas. A. Sweet.[9] After the curettement a wick of iodoform gauze is placed in the curetted area and left to drain for twelve hours.

If a tooth cannot be saved in a healthy condition, it must be extracted. I should prefer that my child lose this perfect occlusion that we are seeking and keep his health than have this ideal occlusion and lose his health because of the retention of a deciduous abscessed tooth. Clinical observation has shown that the permanent premolars that erupt under deciduous teeth that have been putrescent for any long period of time often have a disintegration of the enamel of the buccal cusps and part of the occlusal surface at the time

of eruption. It certainly seems possible that some disturbance would be caused to the newly formed enamel of the permanent premolar if it were bathed in pus from an abscessed deciduous tooth for a long period of time. I do not know that any research work has been done on this problem, but I do feel that it would be enlightening.

Occasionally where a putrescent tooth with a buccal fistula has been successfully treated, the permanent premolar will take the line of least resistance and erupt toward the buccal through the point where the buccal plate of bone has been destroyed by the fistula. Extraction of the devitalized deciduous tooth and retention of the space are indicated until the permanent premolar takes its place in line.

The last resort to retain space until a succedaneous permanent tooth erupts after a deciduous tooth is extracted is the space retainer. After repeated failures with different designs of space retainers I now have fair success with a retainer made as follows: Use banding material 0.006 in. in thickness and wire 0.036 in. in diameter, both of gold alloy. Make a loop of the wire so that it is soldered in two places to the band, one to the lingual and one to the buccal. This permits the permanent tooth to erupt between the buccal and lingual parts of the loop in case the patient is unable to return at

Fig. 3.—Space retainer.

that time. That portion of the loop against the unbanded tooth should be concave to prevent slipping to the lingual or buccal. Be sure to place a stop over the unbanded tooth wherever possible to prevent the force of occlusion or the mesial tipping of the banded tooth from forcing the wire loop down on to the gum tissue. Plan to remove and recement the band at least once a year to prevent decay taking place because of disintegrating cement.

Dr. R. C. Willett[10] of Peoria, Ill., has published some very valuable articles showing many different types of space retainers and prosthetic restorations which give the child occlusion and act as space retainers. Where two or more molars have been lost, partial dentures are very practical, and the wearing of partial dentures by children under eight years of age has corrected digestive disturbances in two cases in my practice. One little girl, whose weight had remained unchanged, gained nine pounds in four months after the removal of infected deciduous teeth and the insertion of a partial mandibular denture replacing four deciduous molars. The porcelain teeth were cut out of the vulcanite as the permanent premolars erupted.

Prolonged retention of deciduous teeth is also a cause of malocclusion, but remember that the child who was late in cutting his first baby tooth will be proportionately late in losing his deciduous teeth. When you examine a child's mouth and see deciduous teeth which normally would have been lost

one or two years previously, suspect trouble and have x-ray pictures taken to determine what is happening. The nonabsorption of the roots of the deciduous teeth may be causing the permanent premolars to be deflected, in which case extraction of the deciduous tooth is indicated. Measure and record the space left at the time of the extraction and observe monthly to determine whether the space is closing faster than the permanent tooth is erupting. If this is happening, a retainer is necessary until the premolar has erupted. X-ray pictures of these deciduous teeth very often reveal congenitally missing teeth, and for this reason never extract a deciduous tooth because of prolonged retention without having an x-ray picture taken first, as you may be accused of negligence and make yourself liable for malpractice. If a permanent tooth is congenitally missing, have x-ray pictures taken of all the unerupted succedaneous teeth, as others may be missing also. Consult an orthodontist regarding the missing teeth in order to plan how to obtain the best occlusion for the balance of the patient's life. Two things must be kept in mind in this planning: first, that deciduous teeth are sometimes kept until real old age, others being lost at normal time even though the permanent tooth is congenitally missing, and, second, that even as late as seven years of age x-ray pictures may not show permanent premolars which are late in calcifying as reported by Robert Dunn of Oakland, Calif.

This forces me to emphasize the value of good x-ray pictures. Too many dentists are taking x-ray pictures of very poor quality; whereas a little time and attention paid to proper technic will be well repaid in pictures of good quality. Do not embarrass the orthodontist by sending him useless x-ray pictures because he is forced to send your patient to an x-ray laboratory to get pictures that show everything to be seen in an x-ray picture.

Frequently mandibular permanent central incisors will erupt lingually to the corresponding deciduous teeth and the deciduous teeth remain very firm. This is due to the fact that only a portion of the lingual half of the deciduous tooth is absorbed. This leaves a very thin spicule of root that will break in extracting unless great care is taken. Do not attempt labiolingual extracting movements but depend upon a vertical pull with a little rotation. These cases are usually associated with an anterior contraction which may correct itself and the permanent central incisor be pushed into line by the action of the tongue. If only one permanent incisor is erupting and it is erupting lingually, remove only the one corresponding deciduous tooth. If you remove two deciduous teeth to give room for one permanent tooth, you will lose that wedging force which the permanent central incisor exerts as the tongue pushes it into line. What has been said of the mandibular permanent central incisor is also true of the mandibular permanent lateral incisor if it erupts to the lingual of the corresponding deciduous incisor.

However, you must remember that the combined mesiodistal diameter of the crowns of the four mandibular deciduous incisors according to Black[1] is only 16.6 mm. whereas the average combined mesiodistal diameters of the crowns of the four mandibular permanent incisors is 22.6 mm. or 6 mm. greater than that of the corresponding deciduous teeth. If there is less than an average of 22 mm. space between the mesial surfaces of the two mandibu-

lar deciduous canines at the time the mandibular permanent lateral incisors erupt, the lateral incisors will erupt either lingually or directly under the corresponding deciduous tooth. If they erupt directly under the corresponding deciduous teeth, they will have to erupt rotated or erupt partially underneath the deciduous canines. In this latter case premature absorption of the roots of the deciduous canines takes place resulting in loss of the deciduous canines at the age of seven years instead of somewhere between nine and twelve years when the permanent canines erupt. This premature loss of a deciduous canine results in the mesial drifting of the posterior teeth on that side and a distal drifting of the anterior teeth toward the space caused by the loss of the deciduous canine. When the permanent canine erupts, there is no space for it, and a malocclusion has resulted which is very difficult to correct.

In practice I believe that if there is not a space of 22 mm. between the mesial surfaces of the mandibular deciduous canines at the time the two mandibular permanent central incisors have fully erupted, you should anticipate trouble and determine whether the permanent lateral incisors are going to erupt lingually or under the deciduous canine. Ordinary x-ray pictures do not determine the labiolingual positions of the teeth, and I have not had much confidence in stereoscopic x-ray pictures. Recently I have had x-ray pictures taken along the long axis of the mandibular anterior teeth by having the child hold a film between the maxillary and mandibular teeth so that the film is parallel to the occlusal plane. By tipping the head far back it is possible to point the x-ray tube under the chin and direct the x-rays along the long axes of the mandibular anterior teeth. This picture shows the labiolingual relations of the mandibular anterior teeth. If this x-ray picture shows that the mandibular permanent lateral incisors are erupting to the lingual, the case may correct itself. If this x-ray picture shows that the mandibular permanent lateral incisors are erupting under the deciduous canines, refer the case to an orthodontist with the idea of expanding the mandibular arch and moving the deciduous canines out of the way of the erupting lateral incisors so that the deciduous canines will not be lost prematurely by root absorption caused by the pressure of the erupting lateral incisors.

One cannot practice dentistry for children very long before observing deciduous molars that seem to sink down into the alveolar process, sometimes so far as to be entirely covered with gum tissue. At times these have been mistaken for erupting premolars. In April, 1932, Frederick B. Noyes,[5] the dental histologist, published a report of histologic work done on "submerging deciduous molars" as he called them. These submerging deciduous molars do not sink into the alveolar process but because they are ankylosed to the bone the other teeth grow occlusally. In other words the submerging deciduous molar is held down while the other teeth grow up around it. Noyes has found the same condition in permanent molars and reports that he has been unable to elongate them with orthodontic appliances. Because of the ankylosed condition these teeth are difficult to extract, and in extracting Noyes advises removing any bone left over the succeeding permanent tooth. If this is done the premolar moves occlusally promptly; if it is not, it may remain indefinitely. Because this submerging is progressive in many cases it

is apparent that due to the fact that the crown of the succeeding premolar cannot extend occlusally, the growing root will be pushed further into the underlying bone. Take successive x-ray pictures to determine whether it is progressive and if so extract and apply a space retainer until the permanent premolar erupts. Many times the first permanent molar will move up and over, submerging the second deciduous molar and close the space so that orthodontic treatment is indicated. Try to anticipate this condition by close observation of the case and application of the previously mentioned preventive measures in adequate time.

Another condition that you will observe in doing dentistry for children is that of the maxillary first permanent molar erupting under the distal half of the second deciduous molar. This causes the premature absorption of the distal root of this second deciduous molar and resulting putrescence of the pulp when the bacteria of the mouth gain entrance. Unfortunately you cannot save this deciduous tooth in a healthy condition, and it must be extracted. As the first permanent molar has already moved anteriorly, it is too late to apply a space retainer and immediate orthodontic interference is necessary to open the space. After the space is opened it must be retained with a space retainer.

Perhaps the title of this paper should have been "How to Enjoy Practicing Dentistry for Children," because it is the striving toward the goal of ideal occlusion that has made my work a fascinating occupation instead of a disagreeable and wearisome labor it might have been. I have tried to picture for you the vision of ideal occlusion as the goal in doing dentistry for children and have mentioned some of the means of attaining this goal that I have found practical.

REFERENCES

1. Black, G. V.: Descriptive Anatomy of the Human Teeth, Philadelphia, 1902, ed. 4, pp. 17, 18, S. S. White Dental Mfg. Co.
2. Lewis, Samuel J.: Thumb Sucking: A Cause of Malocclusion in the Deciduous Teeth, J. A. D. A. June, 1930, p. 1060.
3. Idem: Undesirable Habits Influencing the Deciduous Dentition, J. A. D. A. Sept., 1931, p. 1766.
4. Lyons, Don C.: The Importance of the Early Recognition of Dental Disorders in Children, Dental Cosmos, May, 1924, p. 535.
5. Noyes, Frederick B.: Submerging Deciduous Molars, Angle Orthodontist, April, 1932, p. 77.
6. Stallard, Harvey: Etiology of Crossbites and Gothic Arches or Bucco-maxillary Lingual-Occlusion, Dental Cosmos, November, 1923, p. 1181.
7. Idem: General Relation of Pillowing to Malocclusion, Dental Cosmos, March, 1925, p. 267.
8. Idem: The Development of Crossbites and Gothic Arches, Dental Cosmos, January, 1924, p. 24.
9. Sweet, Charles A.: Procedure for Treatment of Exposed and Pulpless Deciduous Teeth, J. A. D. A. June, 1930, p. 1150.
10. Willett, R. C.: Radical Departure From Theories and Methods Pertaining to Children's Dentistry, J. A. D. A. July, 1932, p. 1085.
11. Wolf, Julius: Law of the Transformation of Bone, Review by Ernest M. Setzer, Angle Orthodontist, April, 1932, p. 66.

DISCUSSION

Dr. Ernest L. Johnson, San Francisco, Calif.—Dr. Foster has given us a most inspiring as well as instructive paper. In his efforts to obtain the goal of ideal occlusion for his patients, he has, through his interest and untiring efforts to serve their welfare, shown one of the chief factors which distinguishes dentistry from an occupation or business, where, I

am sorry to say, some would have it, and placed it in the rôle of a true profession where it belongs. Certainly, in children's dentistry you are rendering a service of such far reaching benefits that it would be impossible to evaluate it in dollars and cents. Approximately 50 per cent of our orthodontic cases today could have been prevented by proper dental treatment at the right time. Another 15 to 20 per cent could be prevented by the early correction of faulty habits. Probably 5 per cent of our cases are traceable to hereditary conditions or sports of nature over which we have no control. The most frequent examples in this group are the mouths containing enlarged tongues or missing or supernumerary teeth.

This leaves about 25 per cent of orthodontic cases which are traceable to malnutrition, prenatal, natal or infant, or a combination of malnutrition during any or all of these stages of development. As dentists, we all have the opportunity to give expectant mothers and mothers advice that may prevent the development of a poor dentition and subsequent malocclusion for their children in later years. I hate to anticipate the aftermath of misery which is bound to follow the radical and ignorant dieting indulged in by so many young women today. To illustrate this point I wish to recite a case history which is self-explanatory.

While this family were living in San Francisco, the oldest child, a daughter, was born. From here they went to Alaska, during the Gold Rush, where the second child was born. When this child was two years old, they returned to San Francisco, and within a year and a half, the third child arrived, and four years later the baby of the family made his appearance. Because of the limited diet, while they were in Alaska, no fresh milk or vegetables, you may get an idea as to the different conditions presented by the mouths of these children, but it would be difficult for any of us to foresee the vast havoc wrought by this malnutrition.

The oldest child's mouth presents full, well-developed arches, needing no orthodontic care, and having an average amount of dentistry. In the second child's mouth, decay was so prevalent that it was almost impossible to keep the deciduous teeth until their normal time of shedding. The permanent teeth decayed almost as badly, the arches were extremely narrow, and the malocclusion so severe that orthodontic treatment was only partially successful. The third child, which was born before the mother had had time to recover completely from the effects of her limited diet, also had a great deal of decay in the deciduous denture, but the permanent teeth were much better. The arches, while narrow, responded beautifully to orthodontic treatment, and he presents a fine mouth today with less than the average amount of dentistry. The baby of the family reached eleven years of age before the first cavity appeared. Today, he has but four fillings in his permanent denture and has a normal set of teeth that would be a joy to any orthodontist. This case is one which may well be used to convince the doubter of the far reaching effects of malnutrition.

SHOULD DECIDUOUS TEETH WITH NONVITAL PULPS BE TREATED?

STUART KABNICK, D.D.S., F.A.I.C., PHILADELPHIA, PA.

PREVENTIVE dentistry for children probably will contribute more toward the extension of human existence than any other scientific contribution at our command during this decade. This thought prompted the treatment of deciduous teeth with nonvital pulps.

The greatest contribution of service to any patient is rendered if the treatment is started as early in life as the very onset of the disease. Why wait until the entire oral cavity is involved? Why wait until metastasis has taken place? The deciduous tooth with a nonvital pulp that goes untreated has greater potential powers of destruction in the whole human mechanism than the untreated permanent tooth. The threshold of resistance of the adult is much higher than that of the youngster of thirty months. Added to all possible dangers of the putrescent permanent tooth, is the menace to the child's health that may influence its growth, its mentality, and its whole physical development.

This is caused by the general mixing of the purulent exudate or discharge from such a deciduous tooth with all foods taken into the oral cavity.

The cycle is a long one. Pain may be the cause of lack of mastication: if chewing is attended by discomfort, the flow of saliva is altered, proper oral preparation of the food for its alimentary voyage is lacking, and the entire process produces a septic oral condition with little or no muscular development.

Premature loss of the deciduous teeth does have its detrimental influence on the forming dental arches and on the development of the bones of the face and the cranium; for stunted growth of the ethmoids, the malars or any of the palatine bones will affect their neighbors' normal growth. We have observed a continuous chain of ill effects from the early loss of deciduous teeth and its influence on the permanent teeth. A poorly developed mandible will not permit the proper growth of the submaxillary glands and the sublingual glands. These underdeveloped, crowded organs are constantly taxed beyond their capacity to rid their diseased tissues of their toxins and ptomaines (toxalbumins) if they become inflamed.

Also we must remember that activity of the salivary glands is excited by reflex means. The afferent nerves in this reflex are those that supply the mucous membrane of the mouth, i.e., the trigeminal and the glossopharyngeal. Certainly we cannot anticipate a gland that is underdeveloped and loaded with foreign substances to perform its rôle of producing the necessary saliva if the source of this stimulus is in an inflamed state. If all three pairs of glands, the sublingual, the submaxillary and the parotid, lying in the cheek over the ramus of the mandible, are functioning under ideal conditions, each gland will produce from ten to fifteen times its own weight every twenty-four hours.

It is in this saliva from all these glands that we find ptyalin, without which substance the oral digestion of starches is lacking, for there is no other starch-splitting enzyme present.

An ill-formed maxillary arch will involve the nasal chambers and the communicating sphenoidal, maxillary, frontal and palatal accessory sinuses. Respiration is hampered! Even the olfactory bulb may become disturbed. If there is a disharmony of development of the dental arches, the deleterious effects upon the sense of hearing is manifold. The temporomandibular joint must allow for a proper-sized auditory meatus. Many apparently backward children have been found, upon testing, to show average intelligent quotients, but have been prevented from advancing normally by their faulty hearing. Practically all dental facial irregularities could have been prevented, and the premature loss of deciduous teeth is one of the primary causes of such irregularities.

If entrée of the toxins, enzymes, and end products of putrefaction in large doses is made via the blood stream or the lymph system, it will retard healthy development of the child. The inability to masticate food properly also leaves its destructive result all along the digestive tract. Improper mixing of the bolus with the necessary salivary juices starts the food on an unsatisfactory course of assimilation or digestion. The stomach is unduly taxed when the bolus is bolted, and gastric disturbances very frequently find their causes in poor masticatory processes, one of which is the failure to lubricate the food with mucin.

The attendant pain also leaves the patient distraught, and the distress during the long nights, when the discomfort is usually greatest, wears him down and leaves the youngster open to the many other diseases prevalent in childhood. The fears that fill his overimaginative mind are constantly increased by the torture that he endures. Visions of surgical treatment crush the last bit of strength reserve that he has mustered. Sometimes children will hide their pain until it becomes so agonizing that the dentist is confronted with a patient who is so completely exhausted that he is a poor risk either for the use of a general anesthetic or for surgical procedures.

If we surgically remove the deciduous teeth with nonvital pulps long before their normal period of exfoliation, we are condemning the child to any one of the many types of malocclusion that invariably result. The proper spaces are not retained, and the erupting premolars must be forced into buccal or lingual occlusion because of the first permanent molar encroaching into the spaces normally occupied by the premolars; hence the general devastating effect on the entire occlusion of the permanent complement of teeth.

This can all be prevented if the problems of the carious deciduous teeth are approached scientifically. Simple cases of dental caries in deciduous teeth can be treated as well as in permanent teeth. Great care must be exercised in all cavity preparations because of the comparatively large area occupied by the pulp in deciduous teeth.

If destruction of the pulp should take place, it does not mean the removal of the deciduous tooth but the filling of the pulp canal, pulp chamber

and the disinfection of the roots and any possible necrotic periapical tissues. (Fig. 1.)

The general practitioner of dentistry must solve this problem of protecting the permanent tooth bud from any destructive influences during the entire formative period. One very important phase of this protective process that has almost been completely eradicated from the operative procedures is the treatment of the deciduous tooth with a nonvital pulp. It has been my experience in studying eight thousand clinical cases* over a period of ten years to observe the erupting first permanent molars or the recently erupted first permanent molars and premolars presenting an enamel of such poor quality that it crumbled or chipped under the simplest application of force with an excavator or explorer. Hundreds of these teeth showed pulp involvement only a few months after they made their appearance through the soft investing tissues. Many permanent teeth also present an enamel formation that is short at the cementoenamel junction. (Fig. 3 *c* and *e*.)

Much of this diseased tooth structure is caused by the destructive action of the weak acids (acetic, formic, lactic and butyric) formed by bacterial metabolism and respiration in the canals of the adjacent deciduous teeth. The tooth bud growth is inhibited in proportion to the amount of acids present. The essential alkalinity (normally maintained at P_H 7.4) is neutralized, with a disturbed tooth formation resulting. The enamel, the dentine, the cementum of the permanent tooth and the contiguous bony structures are decalcified by the slowly penetrating acids. The purulent effusion continues its devastating effects on the tooth buds that are in infraclusion just as long as we permit this septic condition to remain. The teeth most commonly affected by the loss of a pulp in a deciduous molar are the four first permanent molars and the eight premolars. This is one explanation for the early loss of these multi-rooted teeth as compared with the delayed loss of the anterior single-rooted teeth.

Nature made little or no provision to protect the tooth germ on its journey in the osseous tissues, first lingual and then occlusal, from the onslaughts of the acids. It is within our realm to remove the causes of this annihilation of tooth germs.

The neutralization of these acids, progressing upward, to a normal alkalinization of the necrotic areas (necrotic bone shows P_H 4.5 to P_H 5.5) adjacent to the deciduous teeth with nonvital pulps, will many times prevent complete destruction of the tooth bud by the septic material present.

Many teeth commonly referred to as congenitally absent have actually been destroyed in this manner. Also some tooth buds are violently disturbed by extraction forceps and elevators. I am of the opinion that many of the abnormal tooth formations that we encounter in the mouths of our older patients, have their inception during the thirty-month to the nine-year period. Pathologic conditions of the enamel, dentine, cementum, and even the dental pulp may have their primary cause dating back to this period when the environment of the tooth bud was acid. When one considers that the dental

*This study was made in the Bureau of Health Dental Dispensaries of Philadelphia, Philadelphia General Hospital and the Philadelphia Mental Hospital at Byberry.

capsule has its origin from the mesodermic cells of the outer portion of the dentinal papilla, it can be readily accepted that this embryonic fibrous tissue sac, disturbed so that its disappearance after the histogenetic periods have passed is prevented, may give rise to any of the tumors later in life.

Let us now consider one method of preventing the loss of the teeth under discussion. Because of the fact that we are dealing with children ranging in age from thirty months to twelve or fourteen years, it is necessary to be able to produce a scientific root canal filling (Fig. 1) and disinfection of the dentine and periapical tissues with a minimum amount of discomfort and inconvenience to the patient. As the problem of placing a rubber dam on a

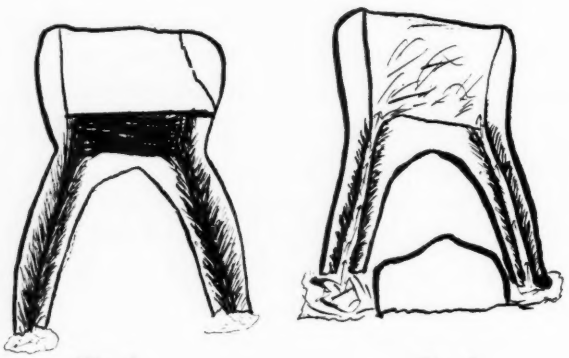

Fig. 1. Fig. 2.

Fig. 1.—Main canal filled. Dentine completely disinfected. Root-filling influencing the alkalization of the periapical tissues.

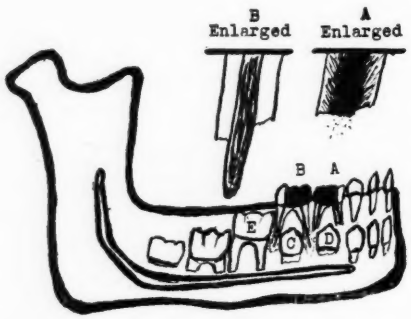

Fig. 3.

tooth or teeth in the mouth of a three-year-old youngster presenting a pericementitis would be almost insurmountable, the material to be used must still have bactericidal value to destroy the pathogenic organisms (both the aerobes and the anaerobes and their spores) present in the pulp canal, the dentinal tubuli, the multiple foramina and the periapical tissues involved even though it is placed without the use of the rubber dam. Of course the use of this means of keeping dry the tooth under treatment should be optional with the operator, but since we are going to leave the tooth open between treatments to permit complete drainage (Fig. 2), it is difficult for me to see any great advantage in its use. On the contrary, it is wise to leave the already inflamed gingival tissues at ease and not to traumatize them further with ligatures, clamps or even the tight rubber dam.

One imperative characteristic of the material to be used in filling the canals of deciduous teeth with nonvital pulps is that it be slowly carried away with a velocity approaching that of the resorption of the root or roots under treatment. (Fig. 3*a*.) It is this requirement that rejects most of the rigid or semisolid materials that are used in the treatment and management of permanent teeth. The projection of an irritating root canal filling into the

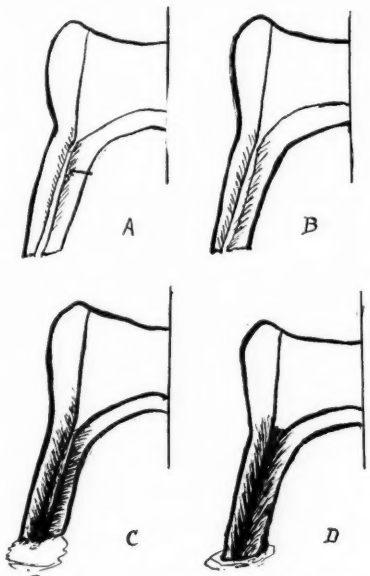

Fig. 4.—*A*. First treatment. Slight evidence of chemicals. *B*. Second treatment. Chemotaxis approaches the apex. *C*. Apex sealed. Canal partially filled. Ready for final filling. *D*. Final filling.

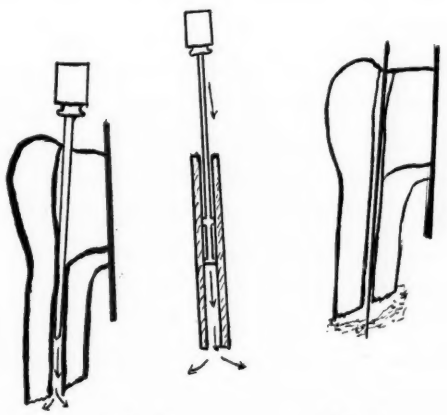

Fig. 5. Fig. 6.

Fig. 5.—Instrument acts as a piston. If the canal content is septic it is very dangerous to force any of this material beyond the apex.

Fig. 6.—Diagnostic wire in position. It will cause little or no discomfort until it engages vital tissue. This may change a chronic inflammation to an acute condition.

osseous tissues in such close proximity to a tooth germ (Fig. 3*c, d, e*) as to disturb its growth (Fig. 3*b*) makes it essential that the material we use be accepted by all the tissues involved in this treatment.

Opacity to the roentgen ray is another characteristic that the medicaments used in the treatment and the filling of the roots of deciduous teeth

must have (Fig. 4*a, b, c, d*) ; for we should be able to observe the progress of the chemotaxis in the canals without using any foreign wires or instruments that usually are plunged (Fig. 6) into the periapical spaces before the patient responds. After all there is no tactile sense in a tooth with a nonvital pulp. The discomfort produced is caused by the application of force to the periapical tissues, either directly with the instrument used or applied through the contained liquid.

It is desirable to obtain a good result in disinfection of the septic tooth structures simultaneously with the formation of the main canal filling in a minimum number of treatments. A restless child will not submit to a long and involved treatment, and for this reason the simpler the technic the better. If the same fine result can be obtained with a few simple instruments, there is no place in children's dentistry for elaborate armamentarium.

Except in rare cases it is unnecessary to ream or enlarge the canals in deciduous teeth. Under no circumstance should a drill be used in this work. Remember that a very important biologic function (Fig. 3*c, d*) is being performed in the tissues adjacent to the field of operation, and any violent disturbance of the tooth bud by a drill, reamer or measuring device may cause a permanent injury to any part or all of the growing tooth.

The medicaments or chemicals used in the disinfection of the root structures as well as the final root filling must be alkaline. If the root filling is a nonconductor of both heat and electricity, it will have little or no effect upon the normal biochemical reactions that are taking place in the periapical tissues.

A slight degree of expansion is a very desirable characteristic of the canal filling as this will supplement an inadequate attempt to fill the canal completely.

The material must be slow in setting to permit ease of manipulation.

Its powers of disinfection should not be lost during the life of the root filling, and yet should remain bland in activity, so as not to cause any destructive influence upon the tooth germs and the contiguous tissues.

Since we desire to hold these teeth in position for a normal length of time, it may require retreating an unsuccessfully treated canal. Our filling should permit us as many attempts to rehabilitate the tooth as we desire and especially after the removal of gutta percha or amalgam canal fillings. The tooth exhibiting a fistula or perforation should respond as well as a simple case immediately following devitalization.

A minimum of pain is always to be desired and especially so in the handling and management of young children. I have found that the greatest amount of discomfort is caused by injudicious use of chemicals and instruments. The placing of any drug in the periapical regions with undue force (Fig. 5) will create osmotic pressure changes and chemical inflammation that is painful. A bacterial inflammation is set up when careless reaming forces the septic canal contents out beyond the apex of the tooth.

It is scientifically correct to leave the teeth open under treatment to insure drainage all during this period; therefore our chemicals must continue

to destroy the bacteria and their spores in the presence of saliva. This allows for greater elasticity of time between visits of the patient to the dental office.

The following case was treated with the above points in mind:

D. B., aged four years and two months. There was a history of previous medication followed by acute inflammation. When acute condition subsided:

Dec. 10, 1932. Mandibular second deciduous molar was treated. Roentgenographic study (Fig. 7). Tooth left open.

Dec. 17, 1932. Mandibular second deciduous molar treated. Roentgenographic study (Fig. 8).

Dec. 31, 1932. Mandibular second deciduous molar treated. Seal test.

Jan. 6, 1933. Tooth comfortable. Case completed. Roentgenographic study (Fig. 9). Stuart Kabnick R. C. F. technic and medication used. (Those

Fig. 7. Fig. 8. Fig. 9.

wishing to use bacteriologic check are referred to my hollow drill method for the bacteriologic study of teeth with nonvital pulps, with special emphasis upon the dentine and periapical tissues.)

The results obtained by hundreds of general practitioners in treating teeth with nonvital pulps by my technic indicate that an attempt should be made to hold the deciduous teeth in their normal position with the aid of a suitable root filling until the proper time for exfoliation. Linked with diet this service will greatly reduce the dental facial irregularities. We shall contribute toward a healthy, permanent complement of teeth. The chances for a clean, robust body will be increased, and there will come a time in the near future when we shall approach maturity without impaired internal organs. Joint diseases will be fewer, and the heart muscles will not show so many organic lesions.

DIET AND DENTITION*

CHARLES A. SWEET, D.D.S., F.A.C.D., OAKLAND, CALIF.

AS WE review the literature on diet and its relationship to health, we are all inclined to believe that the solution to the problem of caries and malocclusion will be solved by a proper understanding and application of diet. To many this appears to be a new study, and it is so easy to apply our favorite theories that sometimes our enthusiasm runs away with us.

The subject of diet is centuries old, for Galen, one of the fathers of medicine, stated in the year A.D. 131, "The lack of nutrition makes the teeth weak, thin and brittle. An excess of nutrition excites a kind of inflammation similar to that of the soft parts. A deficiency of nourishment not only causes the tooth to die away but also enlarges the cavities."

We have been very much concerned about the nutrition of our bodies, and, while we have recognized the teeth as necessary implements in the preparation of foods for digestion, we have failed to realize that they are also parts of the body. The teeth are nourished by the same blood and by the same food materials and are influenced by the character of the food as is any other part of the body. No tissue can function normally unless it is properly nourished, and many times improper nutrition will be first observed clinically by mouth conditions.

There has been such a mass of evidence offered, usually conflicting, that we sometimes wonder whether we can find our way out of the maze. This is particularly true when one must give some time to carry on the practice of dentistry; so it will be my effort to clarify some of the supposed causative factors in the destruction of tooth structure as related to diet.

Of course we all know that the effects of diet on the teeth go back as far as intrauterine life, and at the time the child is born the crowns of all the deciduous teeth are formed. This of course does not mean that the maximum density or deposition of calcium salts is complete or that from this time until the eruption of these teeth definite destructive changes may not take place that would mean a tearing down of the deposited calcium salts. It does not seem unreasonable that alterations might be made in structure of the teeth up to the time of eruptions, especially when we are informed that at all times during life the calcium balance of the blood stream will be maintained to the detriment of the bony tissues.

The strong evidence that the teeth are influenced by diet has led to attempts to determine exactly how each of the possible factors in the diet may operate in effecting the development and maintenance of the teeth. "As your teeth go, so does your body go."

*Read before Sixty-Third Annual Meeting of the California State Dental Association, San Francisco, April, 1933.

PROTEINS

Proteins which are necessary to the building up of the body are in themselves without effect on the teeth. Carnivorous animals and human beings, such as the Eskimos, who live on high protein or meat diets, have good teeth, but this is attributed more to the vitamins which are associated with the fatty portions of the meat and with such viscera as liver and kidneys along with a starch deficiency. Pure proteins have not been demonstrated to affect the teeth, but proteins do contain a considerable amount of phosphorus compounds, and in that way contribute to the mineral intake of the body.

FATS

Fats and oils seem to have no influence upon the teeth, but certain fats, such as those of milk, eggs and those obtained from glandular organs such as liver, contain vitamins A and D which have an effect upon the teeth.

CARBOHYDRATES

Sugars have very generally been suspected of exerting a deleterious influence on the teeth, but Bunting's work has shown the starches as the carbohydrate that has produced the more favorable reactions.

There is such an abundance of evidence that the starches have a decided influence upon the destruction of the teeth that it will be well to review some of the research. Besides this evidence there is no doubt that those individuals who live on diets consisting largely of starches and fats do suffer from dental pathologic conditions, but it may be that the difficulties arising are due rather to an insufficient intake of more essential articles of the diet. One can eat only so much food, and when the appetite is satisfied, other foods are omitted. This is particularly true with the child.

It is possible that the taking of carbohydrate foods may influence the teeth unfavorably, as these foods are soft and mushy and require little masticating efforts. Carbohydrates do not polish the teeth by attrition as do rougher foods, but are sticky and adhere to the surfaces such as the interproximal and gingival margins.

In every instance that has come to my attention where caries has been reported as arrested or controlled by diet, it is in children who have been on a low starch diet.

Bunting, taking a group of rats, fed them on a dry lean meat diet with the result that the rats became lean, mangy, would not breed, and the teeth and bones became whitened, brittle and without resistance to pressure. The teeth showed no sign of caries, but upon the addition of starches to the diet the rats developed cavities in their teeth within a short period of time.

"Then in March, 1932, Mellanby and Pattison published a paper in the *British Medical Journal,* in which they claim that the initiation and spread of caries were almost eliminated by the use of a diet rich in vitamin D and calcium but free from cereals and that the results they obtained were more favorable than in their previous investigation, in which vitamin D alone had been increased in a diet containing bread and other cereals. They appear to

apportion the greatest share of blame for the development of caries to cereal foods rather than to the vitamin deficiency which they had previously stressed."—*The Journal of Pediatrics.*

CALCIUM AND PHOSPHORUS

The teeth are composed largely of mineral matter, chiefly calcium and phosphate; hence it would appear at first glance that these two constituents would be the most important ones in the diet, but taking calcium phosphate into the body and having it laid down as tooth structure are two entirely different things.

The deposition of calcium and phosphate involves an adequate absorption of these elements from the food taken, a normal circulation within the dental pulp through which these elements are carried to the odontoblastic layers and the presence of the calcifying vitamin D which brings about their deposition as enamel, dentine and cementum.

Calcium and phosphorus are essential in the diet, but the amounts necessary for the development of normal tooth structure are quite dependent upon the amounts of the calcifying vitamin D also present. With an adequate supply of vitamin D the diet may contain but a small amount of calcium and yet the tooth structure may be perfect. It is difficult to state just how much calcium is required by the normal individual, but if vitamin D is not deficient, changes in the structure of the teeth are not to be expected. In my experience only one patient has been reported as being deficient in calcium.

The chief sources of calcium in the diet are milk, cheese, egg yolk and the green vegetables, and these same articles of food also contain the calcifying vitamin D. When sufficient of these foods are taken, the administration of extra calcium salts is unnecessary. Better a glass of milk than a spoonful of drug store lime, for the calcium and phosphorus from the milk are better utilized than from any other preparation so far devised.

Too great an excess of calcium without a proper amount of vitamins and phosphate exerts a deleterious effect quite similar to that of an insufficient supply.

It is not very likely that phosphates are deficient in any reasonable diet, as meat and other protein foods when utilized leave behind a considerable residue of phosphates. Extra phosphate is obtained from the whole grain cereals.

VITAMIN D

This calcifying vitamin seems to take first place both in the development of the teeth and in their resistance to caries. It is the skilled workman who lays the bricks in place. In order to appreciate the way in which this vitamin acts, it is necessary to consider the ways in which bone and teeth are laid down. The first step in the process is the formation of a soft jellylike mass known as osteoid or predentine. This is laid down through the action of the osteoblasts and odontoblasts, the materials for its formation being removed from the circulating blood. The next step is the deposition of calcium salts in this matrix, and for this purpose the presence of vitamin D is

essential. When this calcifying vitamin is lacking, deposition of calcium salts is slight and irregular, the matrix becomes deformed and the blood vessels become irregularly arranged. Additional predentine or osteoid is laid down in an irregular manner, and if it does ultimately calcify, more or less permanent deformity of structure results, giving rise to the condition we know as "rickets." The dentine which is formed in the presence of an insufficient supply of vitamin D differs considerably from normal dentine. It is more porous and spongelike, less resistant to mechanical and chemical injury. The enamel as well as the dentine is also of faulty structure when formed during a period in which this vitamin is deficient in the diet; the enamel is more brittle, more easily cracked, and subject to fissures which may be the starting point for caries. The layer of enamel may be thin, irregularly distributed or entirely absent in some areas.

The cementum is poorly calcified and thickened. The structure of the jaw and alveolar bone is also profoundly altered by deficiency of vitamin D during the development period. The jaws are grossly thicker than normal, but they are soft and may be scratched easily with the nail. The tissues are spongy, and there is present much uncalcified osteoid. The softened jaws are readily deformed by mechanical stress leading to malposition of the teeth.

All the effects of deficiency of vitamin D are accentuated when calcium is also deficient in the diet, but with an adequate supply of this vitamin fairly normal tooth and jaw structure may result, even when calcium is present in the diet in minimal amounts.

Although vitamin D is of especial importance during the period of the development of the teeth, it is also important for the maintenance of normal function and health of fully developed teeth. The fully developed tooth, under normal conditions, is subject to injury through attrition and to destruction by the action of chemical agents or bacteria, giving rise to caries. One of the chief defenses against these injuries is the formation of secondary dentine which may be considered as essentially repair tissue. It seems likely also that the blood and dentinal lymph circulating through the teeth may carry immune bodies and chemical constituents capable of exerting an antagonistic action to injurious agents. A deficiency of vitamin D results in poor response in the formation of the secondary dentine and to a disarrangement of the lymph channels in such dentine as is produced. Observation, particularly of Boyd, Drain and Nelson at Iowa City, and of M. Mellanby in England, indicates that an adequate supply of vitamin D in the diet of individuals suffering from caries results in arrest of the process followed by hardening of the damaged tooth structure in the presence of a starch free diet.

The best food sources of this vitamin are the fatty portions of milk, egg yolk and fish oils. We may obtain a certain amount of vitamin D even if we do not take it in the food, for our skins contain a little ergosterol; and when we are exposed to the sunshine, vitamin D is produced in our bodies. The amount of ultraviolet rays reaching the earth is much less in crowded cities with their smoky atmosphere than in the country, so that our environment as well as our foods may affect our teeth.

Associated with vitamin D in most instances is vitamin A, and the association seems most important and should not be altered for these vitamins to be most effective. To obtain these vitamins we really should rely upon the good, old-fashioned cod liver oil or one of its concentrates.

VITAMIN A

Vitamin A appears to have no calcifying action, but it does exert a most important influence on the superficial epithelial structures of the body. Marriott states: "So far as the teeth are concerned, the effects of vitamin A deficiency are observed chiefly in the periodontal structures. The epithelium of the gums and the subgingival epithelium about the tooth attachments become thickened, overgrown, pulpy and later subject to infection. There is a tendency to the formation of calculi about the edges of the teeth. A condition quite analogous to pyorrhea in the human being has thus been produced in animals. The effects of deficiency of vitamin A are especially serious during the period of development of the teeth. It has been found by M. Mellanby that when the diet is deficient during these periods so much permanent change in the structure of the periodontal tissues occurs that normal conditions cannot be reestablished even with a liberal supply of vitamin A in the diet. On the other hand if the intake of vitamin A has been adequate in early life, the individual appears to be markedly resistant to periodontal disease. Furthermore, Marshall has shown that monkeys subjected to orthodontic tooth movement suffer from more radicular absorption and inflammatory reaction about the roots than do animals given sufficient vitamin A. If one can draw conclusions from animal experiments, it would appear likely that deficiency of vitamin A in the diet, especially during the developmental period, is one of the important predisposing causes of pyorrhea."

Vitamin A occurs in milk fat, egg yolk and cod liver oil and is present also in leafy green vegetables and in carrots. Col liver oil and its concentrates are the best source.

VITAMIN C

Vitamin C has been shown to affect the dental pulp, the gingival epithelium and periodontal membrane. The changes have been particularly studied by Percy Howe of Boston and Hojer, the Scandinavian, while Hanke has studied the effects of the deficiency of vitamin C in the diet. The pulp tissue becomes degenerated and may be the seat of hemorrhages, and the odontoblastic layer becomes disorganized and ceases to form normal dentine. Dentine may be resorbed or liquefied, and any predentine which is formed is irregular and poorly calcified. If any changes occur in the dental pulp and periodontal tissues, this surely would interfere with normal circulation of blood and lymph, and this would render the tooth more susceptible to disease or injury.

Hanke in the study of the dietaries of a large number of persons comes to the conclusion that in many the vitamin C concentration was distinctly below what he considered the optimum. Without question, a marked deficiency of vitamin C will cause extensive dental and periodontal pathologic

conditions, and the diet of the ordinary city dweller does not contain any too much vitamin C. This vitamin occurs in large amounts in citrous fruits and in tomatoes. Slight to moderate amounts are present in other fruits and in fresh green vegetables. Vitamin C is largely destroyed by heating.

VITAMINS B, G AND E

These vitamins as far as we know have no effect upon the teeth, but are essential to life; so indirectly they may have a decided effect upon the dental tissues.

CONCLUSION

We all must recognize the fact that each one of the above is a factor, directly or indirectly, in the health of our masticatory apparatus and investing tissues, but, lest we forget, do not overlook the fact that infections and body mechanics have a part in the process of tooth destruction.

Very little consideration has been given to digestive ability and function, but surely this is an important consideration when we know that no two individuals have exactly the same tolerance to foods; in fact many have definite idiosyncrasies. Should we not enlist the aid of all those who are sufficiently qualified with a knowledge not only of diet, but of body mechanics and digestive ability and function for the best interests of the patient and self-satisfaction?

Of course, the ideal would be to have some kind of a pill that might be administered without giving any consideration to the peculiarities of an individual and would not interfere with a patient's food habits.

DISCUSSION

Dr. Lester A. High (Oakland, Calif.).—As Dr. Sweet points out, the subject of diet in itself is not new, but its connection with dentition was for the first time experimentally established in 1918. Howe in that year experimented with guinea pigs and monkeys and showed that lack of vitamin C led to pyorrhea and caries. Then Mellanby did work, proving that lack of vitamin D gave poor structure of the jaws and teeth. As you know, such a condition often leads to pyorrhea. Since it was established that lack of vitamin C as well as D was conducive to dental pathology, a number of investigators began experiments to see what part the other vitamins and minerals might play in relation to dentition. It was found, as Dr. Sweet has so ably explained, that caries is not due to a lack of one thing only, but that a total of many factors led to this condition.

Diet undoubtedly does have something to do with alterations made in the structure of the teeth up to the time of eruption. Martha Jones conducted an experiment in Hawaii. She performed autopsies on a group of 104 children of various ages: babies whose first teeth had not yet erupted and children up to six years whose second teeth had not yet erupted. She found that the teeth before eruption showed decay and acidity. Her paper gives no adequate proof of what dietary lack caused this condition, as the children examined came from very poor families and died of beriberi, a disease due to lack of vitamin B, starvation, etc., and so had *nothing* on which to build up good teeth. Therefore the only definite result we can get from this experiment is that teeth do show decay before eruption.

In discussing the specific dietetic facts which influence dentition, Dr. Sweet has emphasized some particularly interesting things concerning carbohydrates. He says that people on a high starch diet find their appetite soon satisfied and so omit other more important foods. He also says that where caries has been reported as arrested or controlled in a

group of children, it is when they have been on a low starch diet. This is true, but one must remember the corollary of the above statement; that when a child is on a diet high in minerals and vitamins, his appetite is satisfied by these, and so starch is automatically omitted because one can only eat so much food.

Let us discuss Bunting's experiment. He fed rats on lean meat with no resulting caries, but when he added starch to the diet, caries developed. The addition of starches, however, is probably not what led to the caries. Lean meat is high in acid ash. It is also deficient in vitamins A, B, C, D, and E. The rats had then been on such a poor diet for so long that with additional fermentation and lactic acid to cope with, they developed caries. The starch given was candy, and Bunting did not measure the amount of food which the rats ate when the candy was in the cages. Probably they had their appetite taken away by the candy and so ate such a small amount of their regular food, lean meat, that they did not have enough minerals or anything else to keep their teeth in good condition. It was not so much the addition of starch to their diet as the lack of everything else which led to the caries.

We know that starch breaks down into sugar and that one molecule of sugar breaks down into two molecules of lactic acid, which tends to dissolve the enamel on the teeth. Therefore, we can say that starches are harmful to the teeth. The major reason why there should be a low intake of starch, however, is not because a diet high in starch hurts the teeth but because starch gives the body absolutely nothing with which to build good teeth. It is not starch but a lack of something else which harms the teeth. For example, there is one cereal on the market, highly recommended as an ideal food for children, which is deficient in all the vitamins, as well as calcium. It has a small amount of phosphorus, inadequate protein and a large amount of starch, which ferments. Potatoes and other starchy foods may be analyzed in much the same way.

What are some of the necessities in our diet that starch lacks? Dr. Hunter of Oxford University in his article on calcium metabolism makes the statement that calcium and phosphorus are probably the two most important mineral elements for plant and animal life. We know that one of the main causes of caries is a disturbance of the phosphorus and calcium ratio and an improper assimilation and absorption of phosphorus and calcium. We also know that, important as calcium is to health, unless there is enough vitamin D in the system, the calcium will not be absorbed. Dr. Sweet has shown the important interrelation of these three. I should like to make a few additions to his discussion of this subject.

He states that the chief sources of calcium in the diet are milk, cheese, egg yolk and green vegetables. Nutrition experiments have shown that the only two dependable sources of calcium are the ones first mentioned, milk and cheese. Normal adults need at least one gram of calcium daily. Sherman claims that this amount can be regarded as allowing the necessary margin for safety. Hunter goes on to say that until the growth of the skeleton is complete, the daily requirement exceeds this figure. You can get approximately one gram from one quart of milk. A child must have this much. An adult can get along on a pint of milk a day, but this must be supplemented by cheese. As Dr. Sweet has shown the significant part calcium plays in dentition, I think no patient should be allowed to go away from the office without having his calcium intake checked, even though one knows the patient is getting enough vitamin D.

So far as egg yolks are concerned, it takes thirty-two egg yolks to make one gram of calcium, and therefore it would take the average person who eats one egg a day to get in a month the amount he should have in a day.

Green vegetables are also not a reliable source. In fact, they are a very poor source. Amy Daniels of the University of Iowa has shown that the calcium from vegetables is not absorbed unless the vegetables stay in the intestinal tract until the fibers of the vegetables break down by bacterial action. This condition usually does not exist in the normal person.

The reason I emphasize calcium and its sources is because it is especially those people with caries and absorption of the bone who need at least one gram a day.

Dr. Sweet says that it is not very likely that phosphates are deficient in any reasonable diet, but a three-year experiment was conducted on a group of 1,000 children (reported in the

Dental Cosmos) in which their blood calcium and phosphorus were taken. In 90 per cent of the children, the blood calcium was normal, but in only 50 per cent was the blood phosphorus normal. We could say, therefore, that only 10 per cent of tooth decay is due to low calcium diet but that 50 per cent is due to lack of phosphorus. During the summer, there was not any rise in blood phosphorus. We know there is a sufficiency of vitamin D in summer, and so it is not lack of this but a lack of phosphorus in the diet. That means a diet deficient in proteins.

The average man generally has enough phosphorus in his diet because he eats eggs for breakfast, often meat for lunch and a fairly large portion of meat at night. He is not trying to reduce and so also eats breads and cereals. However, the average woman is low in consumption of phosphorus. She is often trying to reduce and so eats few eggs, a very small amount of bread, often just a salad for lunch, and a smaller portion of meat at night than the average man.

Dr. Sweet has given a masterly description of the essential part vitamin D plays in tooth development and has pointed out how necessary this vitamin is if one is to have a normal healthy body and normal healthy teeth.

Vitamin A.—As Marshall has shown, lack of vitamin A in the diet is one of the important predisposing causes of pyorrhea. Pulp stones are developed, huge amounts of tartar, caries and small bone formation.

An interesting fact about vitamin A is that one must separate it and its precursor. It is carotene, found in bright-colored vegetables, that is converted by the liver into vitamin A. In considering the sources of carotene, it is well to remember that almost any fruit has passed through a green stage first (the color green having the best supply of carotene), and therefore ripe tomatoes, strawberries, etc., are as good a source of carotene as leafy green vegetables.

Vitamin B.—Dr. Sweet says that vitamin B, as far as we know, has no specific effect upon the teeth, but new evidence, as a result of experiments by Eddy at Columbia, and Boedecker, published in the *Dental Cosmos* of October, 1932, shows that all their rats with a lack of vitamin B in their diet, developed caries in their teeth.

This vitamin controls secretion of hydrochloric acid in the stomach. It prevents constipation. Nothing will tear down teeth so fast as a cathartic habit where all the minerals, etc., are passed through the body before they are absorbed. Normally, from four to five days is required for food to pass completely through the body. If charcoal is given, mixed with cereal for example, some will be eliminated on the third and fourth day but it will not be finally eliminated until the fifth day after it has been taken. But if a cathartic is given at the same time as the charcoal, complete elimination will be effected on the first or second day, according to the strength of the cathartic. Calcium and phosphorus, which are needed to build up the teeth, are eliminated fairly rapidly.

To sum up: Diet low in *vitamin A* gives unhealthy teeth because the mucous membrane is unhealthy and subject to infection, calculus, decay, pulp stones. Diet low in *vitamin B* means an unhealthy intestinal tract, poor digestion, poor absorption, less hydrochloric acid in the stomach and heavy bacterial flora, decay. Diet low in *vitamin C* is conducive to weak connective tissue, as this, so to speak, holds us together. Diet low in *vitamin D* means that phosphorus and calcium are not properly absorbed. Diet low in calcium and phosphorus: the result of this is that the chemistry of the saliva is wrong.

As Dr. Sweet has stated, optimal bodily health is largely dependent upon a balanced diet. If the body falls below normal, the teeth are often the first to show this condition. The teeth are part of a whole, and to keep the part healthy, the whole must be healthy. Recent research has proved just how important diet is to teeth. In closing, I should like to give a sample diet containing the requisite elements for normal tooth development and the maintenance of optimal dental health:

1 egg: this furnishes protein, phosphorus, iron, and the yolk contains vitamin A.
1 quart milk: this furnishes protein, phosphorus, calcium and the cream contained in milk is a rich source of vitamin A.

Yellow or green vegetables and fruits or those which have passed through a green and yellow stage; vitamins A and C and minerals such as iron, sodium, potassium and magnesium.
1 serving of meat: protein, iron and phosphorus. Liver contains vitamin A.
Wheat germ (1½ tb.) or yeast: vitamin B.
Orange or tomato juice (2 glasses): vitamin C.
Halibut or cod liver oil in some form: vitamin A and only adequate food source of vitamin D.

The above should be a part of the daily diet. The point is that in every good diet, vitamins A, B, C, D, G, calcium and phosphorus must be checked. It is a combination of all these which is essential to good health.

AN ORIGINAL CLASSIFICATION OF PYORRHETIC LESIONS TO BE USED IN SURGICAL INTERVENTION

M. Francis Wielage, D.D.S., Miami, Fla.

IN THE French literature[1] appears a classification of pyorrhea pockets by Delater, which is a wonderful step forward in the understanding and treatment of this dental problem.

Charts are hereby presented, explaining the classification:

In Fig. 1 the outer circle corresponds to the cervico-coronary margin. The dot in the center is the apical end of the tooth. The concentric circles divide the tooth root into four classes, 1, 2, 3, and 4.

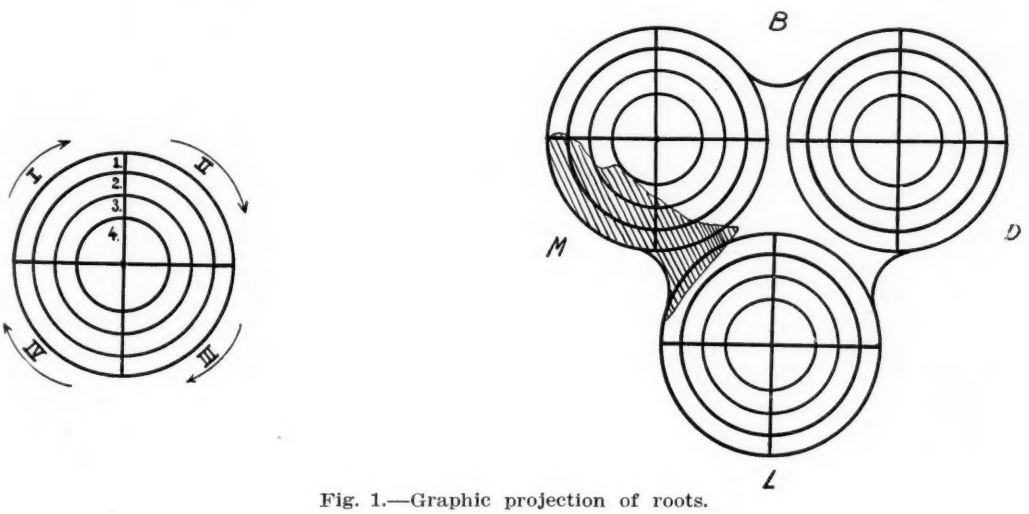

Fig. 1.—Graphic projection of roots.

The circles are divided into quadrants, which are marked I, II, III, IV.

I. Distolabial.
II. Mesiolabial.
III. Mesiolingual.
IV. Distolingual.

Figs. 2, 3, 4, and 5 show a practical application of this principle. This classification, though satisfactory in the treatment by periodontists, can be simplified for the surgical treatment of pyorrhea.

In Chart 6 is presented an original classification, to be used in combination with x-ray interpretation and surgical intervention of paradentosis.

The flap operation eliminates the necessity of the individual pocket classification of Delater, inasmuch as the surgical approach brings to view the field of operation.

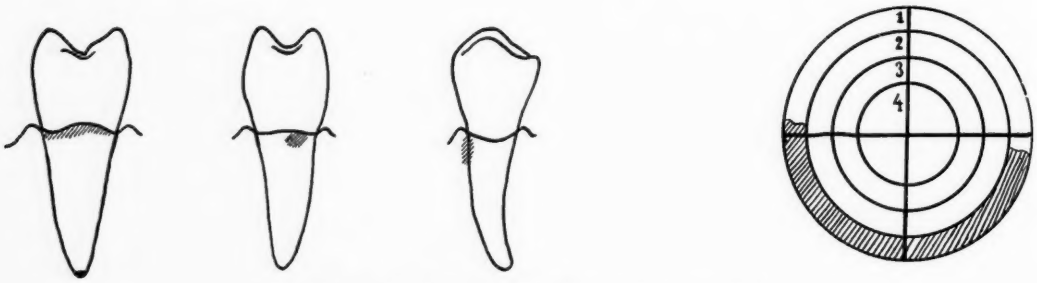

Fig. 2.—Projection of involved area. Class 1.

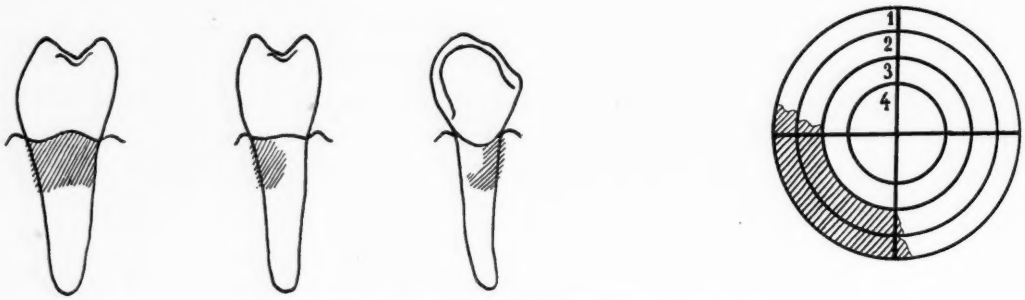

Fig. 3.—Projection of involved area. Class 2.

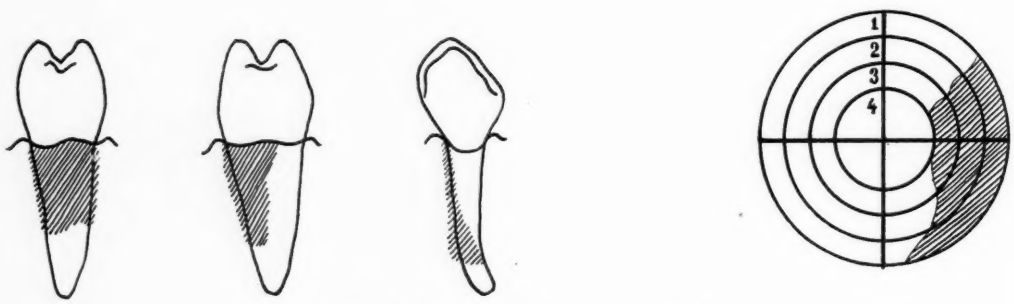

Fig. 4.—Projection of involved area. Class 3.

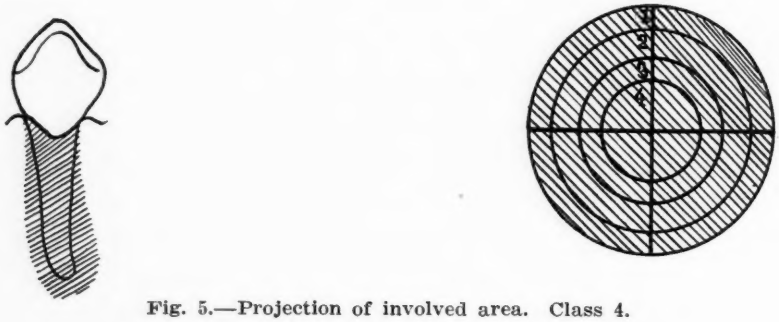

Fig. 5.—Projection of involved area. Class 4.

This classification will enable the dental practitioner to pay attention to Class 1 and also Class 2, which as a rule are overlooked in x-ray diagnoses.

It is far better to attend to this condition in its incipiency than to wait until excessive destruction has taken place.

The dentomedical aspect of a pyorrhetic condition, which enables us to treat this condition systemically in cooperation with the physician, after the

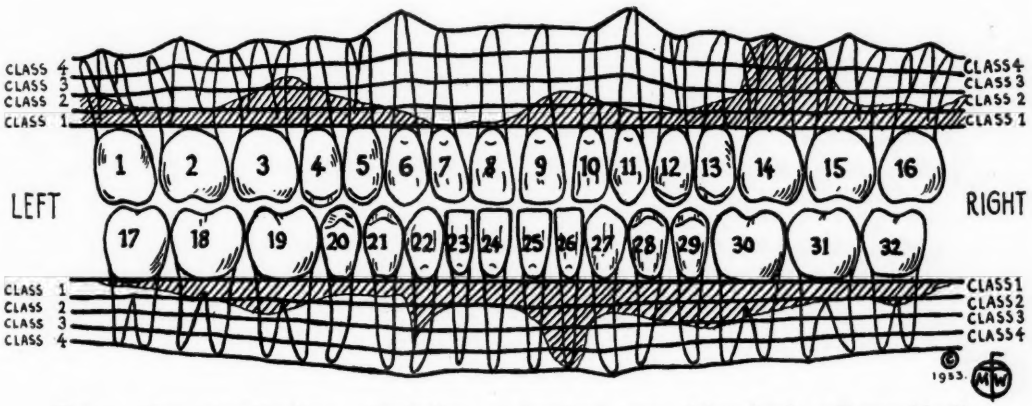

Fig. 6.—New classification. Projection of involved area determined radiographically.

surgery has been performed, is of tremendous benefit to the patient, inasmuch as it will prevent the sequence of intestinal disorders which accompany a prolonged oral manifestation of pyorrhea.

REFERENCE

1. Hulin, Ch.: Recherches sur la Pyorrhée Alvéolaire, Semaine Dentaire, pages 114-117, 1930.

ARE CHILDREN MORE RESISTANT TO DISEASE THAN ADULTS?*

CECIL W. THOMPSON, D.D.S., DETROIT, MICH.

EVERY infectious disease is the result of a struggle between two variables—the pathogenic powers of the bacteria on the one hand and the resistance of the subject on the other. Each of these may be modified by variations in the conditions under which the struggle takes place. Thus a microorganism may be capable of causing fatal infection in one individual, or it may be only moderately virulent in another. Conversely, the same individual may be highly susceptible to one variety of bacteria, and highly resistant to others. Even in reactions with one and the same microorganism, the susceptibility of resistance of the individual may be determined by variations in the physiological state or by the environmental conditions under which the two factors—invader and invaded—are brought together. Therefore, the conceptions 'resistance,' 'immunity,' and 'susceptibility,' are relative terms which cannot be properly discussed without consideration of all modifying conditions.''

''The science of immunity deals with a detailed analysis of these variables. Its practical aim is the determination of methods by which susceptibility can be transformed into resistance, and the rational method of approaching this subject consists in study of the conditions of susceptibility and immunity as they exist naturally in the animal kingdom. The mere fact that both animals and man are in constant contact with infectious microorganisms, many of them in a high state of virulence, indicates in itself that the animal maintains normally a defensive mechanism of considerable efficiency. To a certain extent this escape from harm is due to the external defenses of skin and mucous membrane which, in the healthy state, mechanically prevent the entrance of the microorganisms into the body. Few of the bacteria can pass through the uninjured surfaces of the skin. Added to this, there is some protection in the bactericidal properties of the secretions. An example of this is the inhibitory power exercised by the acidity of the normal gastric juice upon the cholera spirillum. In order to infect the intestinal canal of guinea pigs with these organisms Koch found it necessary to neutralize the gastric juice with sodium carbonate, or to inject directly into the duodenum. Even after entrance to the body tissues a secondary line of defense is encountered by the bactericidal activity of the blood serum and the phagocytic powers of leucocytes and other cells. To a certain extent these forces are active against all bacteria, but they vary in different species, races, ages, and even in individuals in potency against any given infectious agent.''

''An examination of the distribution of different diseases among animals and man reveals that some animals are never spontaneously infected with many microorganisms that cause frequent and fatal disease in others. Also, within the same species or race similar differences exist. We speak, there-

*This paper is an opinion of the literature and was an assignment in the children's section of the Detroit Clinic Club.

fore, of Natural Immunity or Resistance which may be an attribute of the species as a whole, or, within the same species, may be racial, and again, within the same race, may be individual—a matter which may depend upon inheritance, age, sex or accidental acquisition of resistance in the course of life."

"It is not easy, however, to explain all cases of natural resistance, but gradual adaptation of the organisms is probably at the bottom of most cases. The subclinical attacks of infectious diseases play an important part in acquired immunity or resistance. Zingher[1] says that repeated exposure is most important for the development of immunity to diphtheria, adding that race, heredity, and age were important factors. However, the fact that antitoxin in the blood develops in children at a certain age and that it is present in the great majority of horses and other animals, makes it difficult to assume that it is necessarily due to the stimulation of the diphtheria bacilli present in the throat without production of the disease."

"Immunity as demonstrated by the Schick test does not fully account for the lower attack rate in adolescents and adults because after twelve years of age there is a rapid fall in susceptibility which is clear evidence that after that age resistance becomes greater and greater among Schick positive patients. So, therefore, there must be some type of immunity not demonstrated by the Schick test; i.e., Schick positive adults are much less susceptible than Schick positive children.[2] The percentage of Schick negative reactions in children increases regularly with age and reaches its maximum at puberty. A much larger percentage of city children have negative reactions than country children, no doubt because of the congestion in the city and therefore a greater opportunity for contact infection."

"Puberty is the period of greatest activity of the endocrine system. This is shown by increased growth primarily due to the increased activity of the anterior pituitary gland which in turn stimulates the gonads and causes the appearance of secondary sex characteristics. Puberty is also the period of greatest resistance to infection as if nature was intent on the perpetuation of the species. At that time the total death rate is at its lowest point, as well as the death rate from infectious diseases and respiratory diseases, which, of course, are largely infectious in origin. Kirschner found that deaths from peritonitis were lowest at puberty and on further investigation found, as had been previously noted, that minimum resistance to disease occurred at birth and in old age, and the maximum at about fifteen years of age. He concluded that these differences occurred as the result of a biologic law. Stockard[3] says, 'Resistance in the adult to certain childhood diseases is brought about in many cases as a developmental condition rather than as an acquired immunity due to a series of mild infections.' "

"The activity of the endocrine system, which is most active at puberty, plays an important rôle in resistance, in development, and in overcoming of infections. Patients with hypothyroidism are less resistant to infection and their wounds heal less quickly. After removal of the thyroid gland many infections run a more severe course. Patients with diabetes are notoriously susceptible to infection. Jungeblut and Engle[4] found that the age distribution of patients with poliomyelitis varies directly with the time of the de-

velopment of puberty in different countries. They found that if immature animals are infected with poliomyelitis virus, and then given injections of anterior pituitary glandular extract, sexual maturity is accelerated, and in a certain percentage the disease does not develop. Many observers feel that vitamins furnish the raw material for proper functioning of the endocrine glands which in turn increases the resistance to infection."

"In man there are many racial differences of resistance, but these can usually be traced to factors that do not constitute true racial immunity. The extraordinary susceptibility of negroes, Eskimos and other aborigines to tuberculosis and syphilis is more than likely due to the fact that the diseases have been newly introduced among these races which have not, therefore, undergone the natural selection of resistance which has occurred in races long exposed to these diseases. The same thing explains the violence and high mortality with which poliomyelitis and influenza have occurred. This is particularly true on certain islands and in isolated communities."

"Constitutional inheritance of natural resistance has been studied by Hirszfeld in connection with diphtheria susceptibility. He showed that there is some relationship between the general somatic characteristics and the inheritance of a specific immunity. Thus the children of Schick positive parents usually remain Schick positive a long time. If one of the parents is Schick positive and the other negative and they belong to the different blood groups, the children that belong to the blood group of the Schick positive parent are apt to show the diphtheria susceptibility belonging to this parent, and vice versa. It is well known in connection with animals that certain individuals of any animal species are more easily immunized than others. Different persons are born with different potentialities for the rapid and adequate development of antibodies or immunity. This ability appears to be dependent on hereditary factors, although it is possible that it may be modified favorably by proper feeding and hygiene."

"Laboratory animals with which most experimentation is done, rabbits and guinea pigs, if healthy, show very slight individual variations. In fact, the uniformity of reaction on the part of guinea pigs of similar age and weight against measured quantities of bacterial toxins has alone made it possible to utilize these animals in the standardization of antitoxins. Pneumococcus and streptococcus cultures can be measured with reasonable accuracy upon white mice of approximately uniform weight, and the same animals are relatively uniform in their reactions to identical amounts of tetanus poison. Many other examples might be cited which make it clear that healthy animals of the same species, kept under the same conditions, fed upon the same food, and of approximately the same age and weight, differ but slightly from each other in reaction to the same infectious agent. The individual differences in resistance displayed so plainly by human beings are often due, not to any fundamental individual variations, but rather to such fortuitous factors as nutrition, metabolic fluctuations, temporary physical depression, fatigue, or chilling. To this may be added the great variations in individual manner of exposure to infection."

From what has been said and from the following we see that there has probably been much unjustified assumption in regard to age differences. It is of course true that there are diseases like measles, scarlet fever, diphtheria, whooping cough, etc., which are particularly diseases of childhood during preschool and school ages. There might of course be a susceptibility factor, depending upon age alone, but there is no possibility of satisfactorily proving this, at the present time, in view of the fact that in all such diseases human beings are universally susceptible at birth, and the exposure begins intensively in the early years. After that the individuals are relatively immune because of their attacks, and exposure becomes less frequent in the course of changed habits. It would take much more accurate statistical information than we possess to prove that in addition to these factors there is a real susceptibility difference. Moreover, adults from the country districts, never before exposed, contract these diseases just as actively as do children in cities—a fact amply demonstrated in the camps composed of recruits from the rural districts during the late war. Similar considerations would explain away the supposed age disposition in young adult life for typhoid fever and pneumonia, and analogous considerations can be applied to almost any age group in which a disease is more common than at other periods.

On the other hand, there does seem to be some evidence that many diseases are less fatal in childhood than at later times—a fact for which we can find no adequate explanation. The higher mortality of childhood for some other diseases (tuberculosis, meningitis) can be readily explained by greater feebleness and no opportunity for a partial acquired immunity. While, therefore, we cannot imply that there are *no* age differences in resistance to infection, the facts are not known with sufficient clearness at the present time to draw a definite conclusion one way or the other.

We also may conclude then that acquired immunity to the infectious diseases is largely the result of subclinical attacks—that such subclinical attacks tend to develop a potential capacity which already exists—that young children have less resistance to disease than adults, for as the child grows and matures its powers of resistance to the infectious diseases increases and reaches maximum at puberty—that the low death rate at puberty is largely a result of increased activity of the endocrine system—and that the adequacy of the endocrine system, which in turn depends upon hereditary factors, determines to a great extent the actual resistance to the infectious diseases.

REFERENCES

1. Zingher: Am. J. Dis. Child. **5**: 392, 1923.
2. Frost, W. H.: J. Preventive Med. **2**: 325, 1928.
3. Stockard, C. R.: The Physical Basis of Personality, New York, 1931, W. W. Norton & Co.
4. Jungelut and Engle: Am. J. Dis. Child. **43**: 523, 1932.

CANKER SORES

HOWARD H. BURKART, D.D.S., NORTHVILLE, MICH.

SYNONYMS: Apthous stomatitis, dyspeptic ulcer, apthrosa.

SYMPTOMS

Notwithstanding the fact that the general practitioner is consulted more frequently by adults for advice and treatment, canker sores are primarily a disease of childhood. They are characterized clinically by the formation of little vesicles on the tongue and mucous membrane, the most common situation being at the junction of two mucous surfaces, such as the gingiva with the cheek or lip, or the floor of the mouth with the tongue or gingiva. Occasionally in older children it may be found on the palate and pillars of the fauces. The vesicle lasts only a few hours and then erupts and leaves a depressed, yellowish white ulcer, varying in size from a pinhead to possibly a quarter of an inch. The ulcer is surrounded by a red border. This is the stage usually seen by the dentist, as the vesicular stage is of such short duration that it has progressed to the ulcerative stage before treatment is sought. Occasionally three or four vesicles will coalesce. There is an increase in saliva, and digestion is faulty.

ETIOLOGY

From the literature it is evident that uncertainty exists as to the cause of the disorder. Toxic absorption, direct bacterial action and poor hygiene, alone or combined, have been blamed. Some clinicians believe that the etiologic factor is a disturbance of nutrition or metabolism and that bacteria play only a secondary part. On the other hand, others believe that the ulcers are due to the disturbance of secondary nerves involved. Our observations are that often many forms of stomatitis are local infective processes, while other forms are related to general disturbances, in which they are local expressions of systemic disease. In the latter class, coryza, digestive troubles, mental and psychic disturbances are liable to be accompanied by the lesions. Inasmuch as the lesions occur especially among those with poor digestion and low resistance and are frequently associated with the febrile diseases, are we not safe in concluding that the gastrointestinal disorders are causative factors and that the lesions are probably the result of a superficial infection of one or more of the mouth organisms? In differential diagnosis the lesion is of value. It occurs in malaria, influenza and pneumonia. It is frequent in malaria, rare in recurrent fever; frequent in cerebrospinal meningitis, rare in tubercular meningitis. It is rarely found in typhoid; hence not all infectious diseases are associated with the lesion.

DIAGNOSIS

The typical yellowish white depressed, painful ulcers situated on the tongue and mucous membrane establish the diagnosis.

PROGNOSIS

The lesion yields promptly to treatment and disappears in seven to ten days, without leaving a scar. There may be recurrences.

TREATMENT

Correct errors in diet and improve digestion by the use of fruits and fruit juices and the liberal use of vegetables and foods containing vitamins B, D, and G. The bowels should be kept open. Careful attention should be given to the immaculate cleansing of eating utensils. In very young children the mouth should be sponged with a warm solution of 2 per cent boric acid, applied with a cotton cloth wrapped around the finger. In older children the ulcer should be touched daily with an 8 per cent solution of zinc chloride. Tincture of myrrh mouth wash is beneficial, as are alum and camphor ice. Silver nitrate, while beneficial, causes intense pain. Of the foregoing zinc chloride has proved the most beneficial and satisfactory in my practice.

THE SEARCH FOR HEALTH, HAPPINESS, AND SUCCESS*

MARIE DAVIES SMITH, SALEM, ORE.

THE objectives of this work were to make health education meaningful to the child through activity, to become more familiar with the text *Health by Doing,* to encourage creative work, to make health habits a part of the child's life, to help the child to work with others, and to help the child lead a happier life through health consciousness.

It was attempted to improve and fix such habits as brushing teeth, drinking water, breathing fresh air, getting exercise, having good posture, etc., to improve such skills as reading and writing, and to improve neatness and concentration.

Attitudes of cheerfulness, cooperation, helpfulness, obedience, honesty, industry, and resourcefulness were encouraged.

This unit of work was studied by the fourth grade because unusual interest in health education was manifested in some new health books, *Health by Doing,* which had been presented to this group.

Because this grade was the possessor of the new books and could get such a store of knowledge from them, its members were invited to help in the annual health day pageant. Their assistance and plans were needed by the principal and by the teacher.

Many had been in health plays in other towns and states, and so the class decided they must have a health play and make the costumes, the stage sets, etc. The teacher suggested that they find out all they could about health topics before they plan the play.

The first topic studied was teeth. The children read the material in the book, discussed it orally, wrote stories about "How teeth should be brushed," "Why teeth should be brushed," and "Why the Spanish children have good teeth" (the latter being a geography correlation). To correlate with art, the drawing of a face was taught, and good teeth were shown in the drawing. Children delight in drawing rows of pearly teeth in a smiling face.

The structural part of the tooth was studied and drawn, and oral talks were given on this subject.

Posters showing toothbrushes, pastes, etc., were made, also posters showing how to brush teeth and what foods teeth need.

The activity part of this topic was devoted to painting a very large mouth and two large toothbrushes to be used by first grade children in a toothbrush drill.

Large pictures of the fruits and vegetables necessary for good teeth were painted on tagboard, and used as costumes in a dance showing children choosing from the market good foods for their teeth.

*Developed in Grade 4, Park School, Salem, under Bearnice Skeen, principal, and Carlotta Crowley, elementary supervisor.

A very interesting film on health education by Dr. Hill was shown to the children. This added to their zest for studying health, and their joy knew no bounds when they were allowed to handle the toothbrush sale for the school.

They made posters advertising the sale, composed oral talks for their advertising campaign, took the large brushes for signs and visited all the rooms in the school telling about the sale. The children who had the best teeth were allowed to conduct the sales, make change, and count the money. Thus ended the study of teeth.

The following topics were studied in a similar manner: exercise, fresh air and sunshine, foods, posture, sleep, and "our helpers" (meaning people who help them to get health education, e.g., the doctor, the dentist, the nurse, parents, teachers, superintendent, supervisors, and the school board).

The work was correlated with other studies.

Reading.—The children read all material pertaining to each episode in *Health by Doing.* They read booklets published by Metropolitan Co. They read poems, and stories from books brought in by the children and found in the school library.

Writing and Language.—They wrote papers on the following subjects after oral composition by the class: "How to brush your teeth," "Why teeth should be brushed," "Why the children in Spain have good teeth," "Why the children in Italy are healthy," "Why the Greeks have good posture," "Why fresh air is necessary." Letters were sent to the superintendent asking him to visit the room and see the costumes, and to the elementary supervisor thanking her for lending a new health book to the room.

Oral discussion of each topic studied ensued, also planning of activity work and summary of activity periods. Advertising talks were given in different rooms for the toothbrush sale.

Geography.—You will notice that the correlations under "Writing and Language" include some geography. Effects of climate, food, and geographic environment were discussed in relation to health of peoples in Norway, Holland, France, Italy, Greece, Spain, Switzerland, and northern North America.

Arithmetic.—Measurements for costumes, letters on signs and posters, and handling money for the sale.

Physical Education.—Posture was emphasized, the water drinking habit was established, folk dances, and games were learned.

Art.—They painted costumes, lettered signs, made posters, and chose pleasing color combinations.

This unit of work was summarized by an all school health day pageant. The title of this was "The Search for Health, Happiness, and Success."

The story is of a traveler who is seeking health, happiness, and success, and comes at last to Healthland. He asks the King and Queen of Healthland whether they can help him. They inform him that they can help him and bid him watch their loyal subjects who are just going to become Knights of Healthland. The traveler is seated and watches what appears on the program.

ABSTRACTS OF
CURRENT LITERATURE

NUTRITION AND PEDIATRICS

By Samuel Adams Cohen, M.D., New York City

It is the purpose of this Journal to review so far as possible the most important literature as it appears in English and foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Encephalitis in St. Louis. J. P. Leake. J. A. M. A. **101**: 12, 1933.

In a special article written for *The Journal of the American Medical Association* the author, who is senior surgeon, United States Public Health Service, in charge of the encephalitis investigation makes some timely remarks regarding the epidemic of encephalitis in St. Louis. From August 7 to September 10, 1933, 656 cases of encephalitis had been reported in the city of St. Louis and in St. Louis County. Leake states that the case fatality will be about 20 per cent. Although comprising only 13 per cent of the population, the age group over fifty-five years has had 35 per cent of the cases, and the case fatality in this oldest age group has been about double the rate of the other age groups.

As noted in this epidemic the onset of encephalitis is as a rule fairly sudden and not prolonged for more than three days to reach a definite development. General malaise, fever and headache seem to be the leading early symptoms. Vomiting and other gastrointestinal symptoms are not uncommon. However, the first indication of this disease may be manifested by signs and symptoms pointing to cerebral involvement. Not infrequently painful sensations of the abdomen and legs are complained of in the early stages.

Leake states that the incubation period of encephalitis is probably a week or more. Thus far drinking water and milk appear to be excluded as major factors in the spread of the disease. Connected cases and cases in the same family have been occurring nearly as frequently as would be expected in an anterior poliomyelitis epidemic of similar intensity and distribution.

During the early part of this epidemic a Metropolitan Health Council was formed by the local health officers of the St. Louis area to cope with the epidemic and also to make an intensive study of all factors pertaining to the epidemic, more particularly as to the cause of the disease and its modes of transmission. In a preliminary report, R. S. Muckenfuss, assistant professor of medicine in Washington University School of Medicine, chairman of the committee in charge of research of this disease, states that monkeys have been inoculated with material of patients suffering with this disease and observed

that from the eighth to the fourteenth day thereafter there was an occurrence of fever, tremor, incoordination and weakness characteristic of human beings in whom this disease developed. However, this authority reports that many weeks' work has yet to be done before it can be stated that the human disease has been established in animals.

Leake states that the extension of the disease from one case directly to another, when the cases are recognized and precautions are taken, is unusual.

Chemical Composition of Saliva and Blood Serum of Children in Relation to Dental Caries. Rebecca B. Hubbell. Am. J. Physiol. **105:** 2, 1933.

The author concurs with the general agreement in the literature that variations in the composition of saliva between different individuals and for the same individuals on different days and at different hours of the same day are sufficiently great to offset somewhat the evaluation of salivary analysis.

She quotes Karshan, Krasnow and Krejci, who, using dental students as subjects, found slight variations between saliva of those who were free from caries and those who were known to have active caries. Other investigators found no difference between P_H of saliva of caries free children and those with active caries.

This investigator reports her observations for eighteen months on 32 children between the ages of nine and sixteen years. About half of these children had active caries and the other half were practically free from active caries and were used as controls. Hubbell noted (1) that the carbon dioxide capacity of saliva of caries free children was about 44 per cent higher than that of children of the same age who had active caries; (2) that the titratable alkalinity of the saliva of caries free children was about 24 per cent higher than that of children of the same age who had active caries; (3) in other respects, analysis of the saliva (total solids, ash, calcium, phosphorus, chlorides, diastatic activity and P_H showed no consistent differences between the two groups; and (4) the blood serum calcium, the inorganic acid soluble phosphorus and P_H were the same in both groups of children.

The Effect of Pasteurization Upon the Nutritive Properties of Milk. William G. Savage. Lancet **1:** 8 and 9, 1933.

Savage believes that the confusion noted in the literature concerning the effect of pasteurization upon the nutritive properties of milk is due to the misinterpretation of the meaning of pasteurization. According to the official definition of the Ministry of Health, England, pasteurization is the heating of milk to 145° F. and holding it between 145° F. and 150° F. for thirty minutes, after which the milk is rapidly cooled. Accepting this definition of pasteurization as the criterion, Savage, who is County Medical Officer of Health, Somerset, takes up the effect of pasteurization upon the various constituents of milk.

As a result of pasteurization, the only changes noted in the fat content of the milk are physical alterations which cause the cream to rise less rapidly.

Proteins are altered slightly and lactose is not affected by pasteurization. In regard to the enzymes contained in the milk, the significance of its changes is of academic interest only.

The most important of the mineral salts contained in the milk is that of calcium, and Savage notes that although there are some minor changes in the diffusibility and solubility of calcium, the literature presents no evidence that any calcium is lost during pasteurization.

The most interesting discussion concerning pasteurization of milk centers about its vitamin contents. Milk contains all the known vitamins but the amounts are variable. Vitamin A, which is to be found in abundance in milk, is not affected by the temperature of pasteurization. Neither are vitamins B_1 and B_2 affected by the temperature of pasteurization. As is well known, vitamin C is the least heat stable of the known vitamins, and therefore there is some destruction of this vitamin by pasteurization. Savage mentions a practical point, however, when he states that cow's milk alone should not be relied upon to furnish vitamin C in the diet. Vitamin D which is found in variable quantities in milk (sometimes in very small amounts) is not affected by pasteurization. Vitamin E, which is present in milk, is remarkably resistant to heat and like vitamins A, B and D is not affected by the temperature of the pasteurization.

In his perusal of the literature Savage notes that animal experimentation has failed to indicate any known substance contained in milk which is destroyed by pasteurization. He also states there are hardly any worthwhile clinical studies on human beings evaluating the relative merits of raw cow's milk and pasteurized cow's milk on nutrition. Moreover, there is no clinical evidence which has demonstrated that pasteurized milk is less nutritive than raw milk for the young child. He rightfully emphasizes the vast amount of clinical evidence which has failed to show any detectable harm in the nutrition of children who have been brought up on heated milk. From a clinical point of view this negative evidence is of the greatest positive consideration in again stating that with the exception of a few insignificant alterations mentioned above there are no known detrimental effects of pasteurization upon the nutritive properties of milk.

Gastric Secretion in Fever and Infectious Diseases. Hsiao-Ch'ien Chang. J. Clin. Investigation **12**: 1, 1933.

The causes for "nausea and vomiting" which usher in the onset of many infectious diseases and "anorexia" which persists throughout the course of the disease are the subjects of investigation by Chang. The author points out that in febrile conditions derangements of gastric functions because of either motor disturbance or a secretory anomaly constitute one of the common symptoms.

Chang, who writes from the Department of Medicine, Peiping Medical College, Peiping, China, used histamine as a stimulus to gastric secretion to enable him to follow the behavior of the gastric glands after subsidence of

the fever. In all, 106 febrile patients were observed, and the vast majority of these were hospitalized for typhus fever, typhoid fever, or pneumonia. In this series no patient was less than ten years of age.

This investigator reports that during the particular illness the average decrease of gastric acidity was reduced to one-third of the normal. In addition the total chloride and volume of secretion showed similar but less marked changes. The decrease of gastric function was proportional to the height of fever, and Chang states that anemia and general physical fitness played no rôle in the result.

In accordance with clinical experience it is interesting to note that soon after the disappearance of the fever 90 per cent of the patients had normal gastric functions.

As an explanation for his results the author suggests the hypothesis in which the pathologic changes which occur in the stomach during fevers is compared with the cloudy swelling noted in the kidneys. In both instances functional disturbances seemed to be transient.

CORRESPONDENCE

A QUICK WORKING MODEL

Select a suitable tray; place the modeling compound in a vessel to soften; while the compound is softening place your half round guide pins in the half round tubes on the bands in the mouth.

The compound should now be in workable condition and ready to take the impression. (This technic I gave during the meeting in Chicago in 1918.) As soon as the compound is cool, remove from the mouth; you will find the half round guide pins in their position in the impression. Wash the impression in cold water, dry with cotton and air syringe. Now place the half round tubes over the half round guide pins and allow them to extend high enough to become imbedded in the coecal model material.

Now paint the impression with 3 in 1 oil (or any good light oil), use a small camel's hair brush to paint the impression well; you are now ready to pour the model.

Use warm water and mix in the coecal material rather slowly until the mix is a heavy cream consistency, place a small amount of the material in the impression and vibrate to place, adding as required to build the model; build high enough to form a working base. As the coecal starts to harden, trim to approximate shape desired, now remove the tray from the compound, which now because of the heat from the setting of the material has begun to soften the compound around the edges. With a little care starting at the distal buccal, you can now begin to remove the compound from the model working around to the other side and the lingual part will come away very easily, giving you a good working model, in about ten to twelve minutes' time.

Jesse F. Keeney, D.D.S.
Quincy, Ill.

BOOK REVIEWS

Local Anesthesia in Dentistry

Local Anesthesia in Dentistry, with Special Reference to Infiltration and Conduction Anesthesia. A Text-Book for Dentists, Physicians and Students. By Guido Fischer, Dr. Med. Dent., Et Phil., translated by Louis I. Grossman, D.D.S., Dr. Med. Dent. Fourth American edition, completely revised, 222 pages, 150 illustrations, colors. Philadelphia, 1933, Lea & Febiger.

This book is one of the very outstanding books published on the subject of local anesthesia in dentistry. There have been important changes in the composition of novocaine and in the method of its injection, all of which are amply covered in this work. Of interest, further, is the importance of buffered anesthetic solution, as are the means for preparing buffered solutions. The significant changes in the injection technic are given, and more attention is paid to a description of the preoperative preparation of the patient than in previous editions. A discussion of anesthesia for children, both local and general, and a description of methods for safe sterilization of instruments are also included. The book is elementary enough for the beginner but is also highly practical for the practitioner. It is comprehensive; the illustrations are beautifully done; a well worthwhile book, one highly practical for everyday use in the dental office.

Moderne Orthodontische Therapie

Moderne Orthodontische Therapie. By Privatdozent Dr. G. Korkhaus. Edition 2, Berlin, Herman Meusser.

The first edition of this textbook appeared in 1927. It contained a preface by Prof. Kantorowicz, who stated that it was the result of three years' experience in practice and teaching of the methods recommended in the book. In spite of this limited time it is Kantorowicz' opinion that Korkhaus had succeeded in producing a book of so high a standing that "in America nothing of the same kind can be placed beside it."

Any experienced orthodontist who reads this certificate of Prof. Kantorowicz will no doubt find it hard to suppress a smile when he recollects his own knowledge of orthodontia after three years of practice. The American Board of Orthodontia has divided the applicants for their certificate into three classes: the second class comprises practitioners of between seven and fifteen years of practice limited to the specialty and in the third class are placed specialists of less than seven years' practice. It is only applicants of the first class, specialists of more than fifteen years of exclusive practice, who may be given their certificate without passing an examination. The Board being of

the opinion that a practice limited to orthodontia during less than fifteen years is no guarantee in itself, the three years spent by Dr. Korkhaus in practice and teaching must have had wonderful results if he has in this short time become competent to write a textbook of the quality Prof. Kantorowicz imagines.

Since it has been considered expedient to reprint this advertisement in the second edition, and since consequently the book may be supposed to contain the essence of modern orthodontia, it may be of interest to examine it at some length.

The methods of treatment, which appear to be the special object of the author's interest have been known quite a considerable time. The early treatment was suggested by Bogue in 1906; Lourie's high labial arch in 1914, the rotating springs of the same in 1917; an account of Mershon's lingual arch with finger springs was published in 1918. It is something of an exaggeration to call these old methods "modern." The author makes the astonishing statement that the Mershon lingual arch was not introduced into Germany before 1924. For six years the German colleagues were in ignorance of the method. This statement will surely surprise any one who is familiar with the German nation's intensive interest in the happenings all over the world, and the promptness with which it adopts valuable improvements from foreign sources. But perhaps the statement can be more easily explained by the probability that the first adherents to new methods are not necessarily the same individuals that make the most propaganda with something they have not themselves invented.

One of the author's objects is evidently to demonstrate the superiority of Mershon's appliances over the Angle system. Herein he is making the same mistake as Strang, when this latter author attempted to discredit Mershon's methods. It is evident that every system has certain disadvantages, and it is a very easy matter to produce arguments in any direction. Strang made a mistake in that he made much of failures which clearly were the result of the operator's want of judgment. Korkhaus makes the same mistake.

Curiously enough, Korkhaus considers the inconspicuousness as one of the minor advantages of the lingual arch. It appears to me that it is chiefly this advantage that has made it so popular. The disadvantage of an unsightly appliance is so considerable that the labial arch would have become quite obsolete if, indeed, it had not possessed qualities which the lingual arch does not have. It is, however, superfluous to waste any words on a comparison regarding cases for the treatment of which we are limited to one method. A comparison between them has value only in respect to cases in which the final results are the same. The problem will then be of an economical nature, but does not seem so easy to solve. The great advantage of the old Angle system was that by direct methods adaptations and solderings could be made at the chair by the operator himself, without any assistance of a laboratory man and without a laboratory. Even retainers with soldered assemblings of several bands were free-hand soldered at the chair. When the patients were gone, the operator was free. In a practice with appointments for patients filling out all the office hours this was an advantage. A

disadvantage was, as Korkhaus also states, the many visits for each case. But if, as often happens in a clientèle of school children, certain hours are difficult to get occupied, it will be a great advantage if during these hours the operator can in the laboratory find employment that shortens the work at the chair.

In the seventh edition of his textbook, published in 1907, Angle made the statement that it was unnecessary to effect any special root movements after an expansion of the arch, as any desirable change in the inclination of the teeth would follow through the effect of function. He also published cases in which this had happened. Later, he changed his opinion and his methods. In the German edition of 1913 he published accounts of cases carefully treated with "pin and tube," in which from the standpoint of occlusion the most perfect results had been attained. But the final results were not shown.

It may be of interest to recall Angle's categorical statement of the year 1907, the retreat from this position, commenced by himself in 1913 and completed by Strang in 1922, and with this compare Korkhaus' categorical statement of 1932. Korkhaus claims that if only the force of the springs is correct, then the desired result will be permanent and will not be attended by any abnormal inclination of the teeth. "The forces of mastication have . . . . a straightening effect, resulting in a maintaining of the normal axial position of the teeth . . . . ." In reality this is a statement of exactly the same import as Angle's of 1907. If this latter had been true, nobody would have taken the trouble of operating with the working retainer, pin and tube, or the latest Angle appliances, which necessitate banding of quite a number of teeth.

It is too much to expect that a textbook shall contain the rather voluminous material which would be necessary to prove the statement I have just criticized. It ought, however, to have been published somewhere. But if we study the available reports of cases treated with lingual arches, we shall not find any evidence for the thesis that the results of treatments with delicate springs are more permanent than those in which the Angle methods have been used, nor do we find that the final inclination of the teeth is different.

In this connection I should like to remind the reader of a statement by Angle in the early part of his career, before he had become so absorbed in technical details that his views had become seriously circumscribed. It had, if not the exact words, yet a meaning something like this: "I think it is of a secondary importance which appliances are used. The essential thing is the objective of the treatment and what is effected." I believe that any one who has used different appliances and has examined the results several years after the treatment is completed, will arrive at the conclusion that the great problem in orthodontia is to be able to decide what ought to be done in different cases. Compared with this the technical execution is, as a rule, an easy matter.

Korkhaus' textbook gives very meager information concerning this most difficult part of orthodontic practice. In the chapter on "Directions for use of the modern appliances" we find the following (page 185): "Condition (Sachlage): all the teeth in one jaw are too far mesially in comparison with the other jaw and the skull. This is best ascertained by help of an analysis of

a photograph in profile. Furthermore, Simon believes that it is possible to use the relation of the cuspids to the orbital plane as a point of diagnosis." The reader is left to decide himself whether this "Sachlage" is present or not.

The second edition contains a chapter on "Prophylaxis and early treatment." It appears that at present there are very different opinions concerning the most suitable age for treatment. Korkhaus advises very early treatment. He recommends the age of seven years in cases of "Progenie mit Wachstumsvorsprung des Unterkiefers," or protruding chin with forward growth of the mandible. Korkhaus has in an earlier article published an interesting investigation of the presence of malocclusions at different ages, and arrives at the conclusion that the percentage of some of them show an increased and others a decreased frequency. Provided that this relation also holds good, if the material belongs to the same individuals which are followed the same length of time, this would mean that certain cases of malocclusion improve without any treatment. Treatment of all cases in a group with "Häufigkeitsabnahme," diminishing frequency, would mean an unnecessary interference in the number of cases to which the decrease amounts, but, on the other hand, the operator will be credited with results which would have been attained without his help. According to Korkhaus, the "Progenie mit Wachstumsvorsprung" belongs to the anomalies with diminishing frequency. In my opinion an early treatment of this progressive type is without permanent success. On the other hand, there are good reasons to start early treatment in cases of "Zwangsbiss" (forced anterior bite). The differential diagnosis between both these types is perhaps not very easy at an early age. Accordingly, a wholesale treatment of all early cases of anteroclusion may be considered legitimate practice, even though a certain percentage are destined to be failures.

In my opinion the problem is this: With mechanical appliances, that is to say methods with a local effect, to which latter also the methods of Rogers and A. M. Schwarz belong, we are only able to cure malocclusions arising from local causes, to which we must count among others "Zwangsbiss" and a large percentage of the cases of distoclusion. But a considerable amount of the improvement we find after orthodontic treatment of those anomalies I have called malocclusions involving the apical base, and which improvement consists in better space for the teeth in cases of crowding, is the result of an amount of growth, which would in any case have taken place even without treatment.

To give a general verdict of the book, I should say that it does not do full justice to its title. Mainly, it gives information as to how the different individual movements of the teeth are to be executed, which appliances are suitable for these movements and how the appliances are to be made. On these matters the book gives reliable instruction. Being tolerably complete and very well supplied with instructive and clear illustrations the book will be of help to the operator who already has a clear understanding of what the result of his treatment ought to be. Also the beginner will find a number of valuable directions as to technical details. But it is not advisable for a be-

ginner in the practice of orthodontia to attempt the treatment of patients, relying exclusively on a good technical training and the directions concerning plans of treatment which the book contains.

The author's strong point is his knowledge of materials and appliances, and it appears to the reviewer that he has included all that is essential of these details. The illustrations being numerous and clear, the book may be a valuable help even to orthodontists who do not master the German language. Korkhaus' book will in all probability also be closely studied by mechanical laboratories which manufacture and sell orthodontic appliances with directions for use.

A. F. Lundström.

The International Journal of Orthodontia and Dentistry for Children

PUBLISHED THE FIFTEENTH OF EVERY MONTH BY

THE C. V. MOSBY CO., 3523-25 Pine Blvd., St. Louis, Mo.

Foreign Depots—*Great Britain*—Henry Kimpton, 263 High Holborn, London, W. C.; *Australasia*—Stirling & Co., 317 Collins Street, Modern Chambers, Melbourne; *India*—"Practical Medicine," Egerton Street, Delhi; *Porto Rico*—Pedro C. Timothee, Rafael Cordero 68, San Juan, P. R.

Subscription Rates—Single Copies, 75 cents. To any place in United States, Cuba, Porto Rico, Canal Zone, Mexico, Hawaii and Philippine Islands, $7.00 per year in advance. Under foreign postage, $7.40. Volume begins with January and ends with December of each year.

Remittances—Remittances for subscriptions should be made by check, draft, post office or express money order, payable to the publishers, The C. V. Mosby Company.

Contributions—The editor will be pleased to consider the publication of original communications of merit on orthodontic and allied subjects, which must be contributed solely to this Journal.

Opinions—Neither the editor nor the publisher holds himself responsible for the opinions of contributors, nor are they responsible for other than editorial statements.

Reprints—The publishers will communicate with authors regarding reprints upon publication of paper.

Communications—Contributed articles, illustrations, letters, books for review, and all other matter pertaining to the editorial department should be addressed to the Editor, Dr. H. C. Pollock, 4482 Washington Blvd., St. Louis, Mo. All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 3523-25 Pine Blvd., St. Louis, Mo.

Illustrations—Such half-tones and zinc etchings as in the judgment of the editor are necessary to illustrate articles will be furnished when photographs or drawings are supplied by the authors of said articles.

Advertisements — Objectionable advertisements will not be accepted for publication in this Journal. Forms close first of month preceding date of issue. Advertising rates and sizes on application.

Change of Address—The publishers should be advised of change of subscriber's address about fifteen days before date of issue with both new and old addresses given.

Nonreceipt of Copies—Complaints for nonreceipt of copies or requests for extra numbers must be received on or before the fifteenth of the month of publication; otherwise the supply may be exhausted.

Entered at the Post Office at St. Louis, Mo., as Second-Class Matter

EDITORIALS

The Nationwide Survey by the A. D. A. to Determine Dental Needs

SINCE new conditions of living are being brought about under governmental direction, the professions are beginning to think in groups about changes which may be in the offing, in the United States.

In this period of transition there is great need for dentistry to acquaint itself as thoroughly as possible with what is now going on, what may take place, and to orient itself as quickly as possible to the new activities which are in progress.

The nationwide survey by the A. D. A. to determine dental needs, conducted in conjunction with the United States Public Health Service is both important and significant,

To go back to the beginning of this whole comprehensive movement, at Buffalo the House of Delegates of the American Dental Association passed a resolution, which, in short, recommended that a Committee be appointed to develop a program to combat panel dentistry or other innovations, further to survey state and county health organizations.

The Committee was appointed; it then revised the recommendations to read as follows:

That the Committee for Dental Health Survey be directed:

1. To conduct a survey of dental activities in state, city and local health, educational and welfare departments and state institutions.
2. To conduct a survey to determine the dental needs throughout the United States (this survey to be confined to children of school age).
3. To create and develop a flexible dental program for state, county and city health and educational departments and organizations based upon the findings of the completed surveys outlined in items 1 and 2.
4. To submit a report of the findings and recommendations to the House of Delegates for their action.

The plan, even at the present time, is taking form in infinite detail, and success is plainly to be in direct proportion to the interest shown by organized dentistry. This move is not fantastic; it has the United States Government vigorously behind it, and it is important to the future of the dental profession in America.

Under the direction of the above Committee the United States Public Health Service has whole heartedly, under the direction of Surgeon General Cummings and Dr. C. H. Messner (chairman), lent its enthusiastic cooperation, and is conducting the first phase of the survey which consists of the dental activities in state health and educational departments and institutions. When this first phase is compiled, the plan will be enlarged and other activities started under way.

Much of the answer to this question will depend upon the support which the dental profession gives collectively and individually to this movement, the importance of which is too generally not understood. The general outline of the plan is elsewhere printed in this issue of the INTERNATIONAL JOURNAL OF ORTHODONTIA AND DENTISTRY FOR CHILDREN.

H. C. P.

Learning to Improve Ourselves in Dentistry for Children

WHEN the Department of Dentistry for Children was started fifteen months ago, it was our hope and purpose to bring to our readers and students in the dental profession a wealth of scientific information relating to the best, most approved, and most effective methods and procedures employed in present-day practice of dentistry for children.

All over our nation in the last few years has arisen a not-to-be-denied interest in that phase of dentistry to which we most frequently refer as preventive dentistry. Surely we all agree that preventive dentistry must begin in prenatal life, and certainly considerable care, thought and professional attention must be administered in preschool and school life.

Dentists all over the world are being forced to inform and improve themselves in their services to children. The flagrant and past fault of the dental colleges in not teaching or giving practical, helpful instruction to the students relative to their responsibility as professional men has seriously crippled and handicapped our profession. While it is possibly true that dentists have more meetings than any other professional group, the fact must remain that the average dentist has been very, very derelict and negligent in improving himself in the handling of the child patient.

The most effective method of learning new methods and technic is of course to do postgraduate work in one of the leading dental colleges or universities. But even in this desire, if one is so moved, and thank goodness many are, there is not a single university or dental college offering postgraduate instruction in children's dentistry. The next best method, and the one most often employed in the past, is a glorified preceptorship of a rather intensive nature. A dentist wishing to improve his methods and practice in serving children usually selects some dentist who has given considerable time and attention to this important phase of our profession's work. A week or ten days spent in the office of the dentist who either is specializing in dentistry for children, or is doing considerable work with children and succeeding with this fine service, is the man more often sought out.

Considerable interest has been aroused in the last five years in the work of the state dental association meetings. The more progressive dental associations are including on every annual program some outstanding clinician or essayist who is capable of teaching and helping the general practitioner in dentistry with the problems of dentistry for children. Many district and local dental society groups are having the successful and outstanding dentists serving children give several days of postgraduate instruction. Other groups are enthusiastically supporting extension courses from some of the leading universities; still others are grouping themselves and paying a capable clinician an appreciative fee to teach them. All these efforts point to the fact that the dentist realizes he must become better informed in methods of serving children in dentistry.

Dental publications are not only welcoming but insisting upon having worth-while articles on all phases of dentistry for children. Several state

boards of dental examiners have added questions on this important part of dentistry to their examinations, and the dental college which has failed to instruct its students by practical, modern and approved curriculum procedure causes the recent graduate to realize that he has not been taught one of the requirements necessary to serve adequately as a doctor of dental surgery.

Study clubs and all day dental meetings where round table discussions are devoted entirely to the more important phases of dentistry for children offer the busy general practitioner, the one who must ever carry forward the progress and success of dentistry, another means of informing himself of what is best and most practical in serving the child patient.

Any dental health program or mouth hygiene campaign must depend for its greatest success upon the dentist. The success in arresting and finally preventing caries and peridontoclasia, the two most common diseases afflicting the human race, depends largely upon the members of the dental profession; since science has proved to the world that dentistry, and dentistry only, can alleviate and finally conquer these. Before we can help others we must inform ourselves; before we can expect legislation we must educate the public; before we educate the public the dental profession must certainly change its methods, practices and general attitude concerning the child. We not only harm our profession but seriously hinder and hurt our service to mankind when we fail to correlate our teachings with our practices. This is an individual matter and must be answered by the dentist in everyday practice.

W. T. McF.

NEWS AND NOTES

Program of American Society of Orthodontists
Oklahoma City, November 8, 9, 10

WEDNESDAY, NOVEMBER 8, 1933

Morning Session

8:00 A.M. Registration.

9:00 A.M. Meeting called to order. Invocation by Dr. A. G. Williamson, pastor of Wesley Methodist Episcopal Church, Oklahoma City.

Address of Welcome by the Hon. J. F. Owens, president of Chamber of Commerce, Oklahoma City.

Response by Harry E. Kelsey, Baltimore, Md.

President's Address. By Wm. E. Flesher, Oklahoma City, Okla.

Business session:

Report of Board of Censors. By Wm. A. Murray, chairman.

Report of Program Committee. By P. G. Spencer, chairman.

9:45 A.M. Paper: Diagnosis of Mesioclusion. By Frank A. Delabarre, Boston, Mass. Discussion by O. W. Brandhorst, St. Louis, Mo.; and G. H. Williams, Chicago, Ill.

11:00 A.M. Paper: An Unusual Infant Diet and Questionable Effect Upon Dentition. By R. G. Willett, Peoria, Ill. Discussion by Homer B. Robison, Hutchinson, Kan.; Samuel J. Lewis, Detroit, Mich.; Joseph D. Eby, New York City, N. Y.; Henry F. Hoffman, Denver, Colo.

12:15 P.M. Luncheon.

WEDNESDAY, NOVEMBER 8, 1933

Afternoon Session

1:30 P.M. Paper: Observations on the Dental Development of Children Showing Various Endocrine Disturbances. By Carlton J. Marinus, M.D., Detroit, Mich. Discussion by C. C. Howard, Atlanta, Ga.; and H. H. Turner, M.D., Oklahoma City, Okla.

2:45 P.M. Paper: Allergic Rhinitis in Children. A Consideration of Its Relation to Facial and Dental Deformities. By Ray M. Balyeat, M.D., Oklahoma City, Okla., and Ralph Bowen, M.D., Oklahoma City, Okla. Discussion by W. E. Stoft, Omaha, Neb.; O. A. Oliver, Nashville, Tenn.; F. E. Hasty, M.D., Nashville, Tenn.

3:40 P.M. Paper: Phosphorus Deficiency in Soil and Plant Life. By Horace J. Harper, Professor of Soils, Oklahoma A. and M. College, Stillwater, Okla. Discussion by A. L. Walters, Tulsa, Okla.

NOTE: Oklahoma Dental Society members are invited as guests to this afternoon's session.

Evening Session

7:00 P.M. Dinner dance and banquet at Oklahoma City Golf and Country Club. (Due to the fact that the banquet is on the first day of the meeting it will be necessary for members to purchase their tickets upon registration. Ticket purchasing will close at noon.)

THURSDAY, NOVEMBER 9, 1933

Morning Session

9:00 A.M. Paper: On the Treatment of Dental Anomalies. By B. E. Lischer, St. Louis, Mo. Discussion by George Grieve, Toronto, Canada; and Oscar Busby, Dallas, Texas.

10:15 A.M. Case Report: Attempting to Clarify a Few Understandable Characteristics in Relation to the Treatment of Posterior Occlusion. By Hugh G. Tanzey, Kansas City, Mo. Discussion by B. G. De Vries, Minneapolis, Minn.

10:45 A.M. Paper: The Growth of the Human Dentition With Relation to the Face and Cranium, a Preliminary Report. By Herbert I. Margolis, Boston, Mass.

11:40 A.M. Two Short Case Reports: Anterior Occlusion and Apparent Anterior Occlusion. By Glenn F. Young, New York City, N. Y.

12:15 P.M. Luncheon for past presidents and executive officers.

THURSDAY, NOVEMBER 9, 1933

Afternoon Session

1:15 P.M. Paper: Twin Wire Appliance. By J. E. Johnson, Louisville, Ky. Discussion by E. N. Bach, Toledo, Ohio.

1:50 P.M. Paper: Tuberculosis in Children. By J. B. McKnight, M.D., superintendent and medical director of the Texas Tuberculosis Sanatorium. Discussion by A. B. Brusse, Denver, Colo.; and L. J. Moorman, M.D., dean of Oklahoma University Medical School, Oklahoma City, Okla.

3:00 P.M. Business session:

Report of secretary-treasurer.

Report of committees.

Election of officers.

Selection of 1934 meeting place.

3:30 P.M. Time permitting, the teaching clinics will start at this time and continue until 5:30 P.M. giving general clinic men an opportunity to see these clinics.

Evening Session

7:30 P.M. Teaching Clinics. Ernest N. Bach, chairman.

TEACHING CLINICS

A. Deciduous Cases Treated. By Charles R. Baker, Evanston, Ill.

B. Advantages of Early Treatment in Mesioclusion Cases. By O. W. Brandhorst, St. Louis, Mo.

C. Detail Technic Treatment of Deep Overbite. By George Grieve, Toronto, Canada.

D. Open-Bite. By Clinton C. Howard, Atlanta, Ga.

E. Closing Spaces of Missing or Extracted Teeth. By William H. Humphrey, Denver, Colo.

F. Cross-Bite. By Andrew F. Jackson, Philadelphia, Pa.

G. Bilateral Posterior or Distoclusion. By Oren A. Oliver, Nashville, Tenn.

H. Differential Diagnosis of Certain Types of Facial Deformities and Their Treatment. By J. Elon Rose, Iowa City, Iowa.

I. Neutroclusion. By Charles A. Spahn, Newark, N. J.

J. A Safe and Simple Method of Operating and Elevating Impacted Canines. By Kirman E. Taylor, Denver, Colo.

GENERAL CLINICS

1. Orthodontic Cases Using Coil Springs as Application of Force. By Edmund B. Arnold, and J. Stier Cunningham, Houston, Texas.

2. Stainless Steel in Orthodontia. By Frank M. Casto, Cleveland, Ohio.

3. A Mandibular Bite Plate With Chin Occipital Traction to Depress Molars in Supraclusion. Chin Anchorage. By Ralph W. Eaton, Rochester, N. Y. Demonstrated by L. M. Waugh, New York City, N. Y.

4. Controlled Root Movement With 0.021 Round Wire and Bracket Bands. By B. Edwin Erickson, Chevy Chase, Md.

5. The McCoy Open Tube Appliance and Result of Its Use. By Fred E. Haberle, Chicago, Ill.

6. Some Orthodontic Hints. By Norman L. Hillyer, Brooklyn, N. Y.

7. A New Orthodontic Mechanism: The Twin Wire Automatic Appliance. By Joseph E. Johnson, Louisville, Ky.

8. Loop Bands and Molar Band Locks. By Brooks Juett, Lexington, Ky.

9. Splint for Simple or Multiple Fractures of Either Maxilla or Mandible. By Harry E. Kelsey, Baltimore, Md.

10. Hook Attachment: Late Developments in the Technic of Its Use. By Hays N. Nance, Los. Angeles, Calif., and Albert H. Ketcham, Denver, Colo.

11. Motion Pictures.

A. Motion pictures of full mouth x-ray examinations of several patients taken at different ages. By Arlo M. Dunn, Omaha, Neb.

B. Motion picture showing abnormal function associated with malocclusion. By Howard E. Strange, Chicago, Ill.

12. Photography.

A. Compact photographic equipment for the small operating room. By Brooks Bell, Dallas, Texas.

B. Gnathostatic and photostatic record. By George H. Herbert, St. Louis, Mo.

C. Photography with process films. By George J. Turner, Wichita, Kan.

D. Standardizing the orthodontist's photographic equipment and technic. By Albert E. Voss, Los Angeles, Calif.

13. Cast Restoration and Retaining Appliance. By Harry H. Sorrels, Oklahoma City, Okla.

14. The Auxiliary Loop as a Necessary Adjunct in the Lingual Wire Technic. By William J. Speers, Boston, Mass.

15. A Method of Soldering Half-Round Wire to Base Wire. By Curtis W. Williams, Shreveport, La.

16. Types of Springs Used With High Labial Arch. By G. Hewitt Williams, Chicago, Ill.

17. A Technic for Constructing Removable Retainers. By Joseph H. Williams, St. Louis, Mo.

18. Demonstrating Instruments for Locating the Relation of the Maxillary Arch to the Median Plane. By Percy N. Williams, Tucson, Ariz.

19. Anatomic Overlays. By Glenn F. Young, New York, N. Y.

20. Electric Plaster Model Trimmer. By Ernest N. Bach, Toledo, Ohio.

21. Chrome Alloys. By A. B. Brusse, Denver, Colo.

22. The Technic of Handling Chrome Alloy Materials. Demonstrated by Members of the Southwestern Society of Orthodontists.

A. Demonstration of Band Construction of Chrome Alloy. By Brooks Bell, Dallas, Tex.

B. Demonstration of Soldering All Gauges Chrome Alloy Wire. By E. B. Arnold, Houston, Tex.

C. Demonstration of the Construction of Lingual Arches of Chrome Alloy Without Using Soldered Half Round Posts. By Frank H. Harrison, Wichita Falls, Tex.

D. Demonstration of Bite Plane Construction of Chrome Alloy. By W. B. Stevenson, Amarillo, Tex.

E. Demonstration of Coil Spring Appliances, Made of Chrome Alloy. By C. B. Cunningham, Houston, Tex.

F. Retempering and Cleansing Chrome Alloy. By Oren H. McCarty, Tulsa, Okla.

FRIDAY, NOVEMBER 10, 1933

Morning Session

9:00 A.M. Business session.

9:10 A.M. Paper: Diagnosis of Neutroclusion. By Wm. R. Humphrey, Denver, Colo. Discussion by Charles R. Baker, Evanston, Ill.

10:25 A.M. Paper: Treatment of Neutroclusion. By Charles A. Spahn, Newark, N. J. Discussion by Lloyd Lourie, Chicago, Ill., and T. G. Duckworth, San Antonio, Texas.

11:40 A.M. Case Report: A Case of Cleft Palate, Found Only in One of Identical Twins. Treated and Observed for Fifteen Years. By Harry B. Wright, Philadelphia, Pa. Discussion by Harry E. Kelsey, Baltimore, Md.

12:15 P.M. Luncheon.

FRIDAY, NOVEMBER 10, 1933

Afternoon Session

1:15 P.M. Case Report: Result of Treatment of Case With Maxillary and Mandibular Impacted Canines and Other Complications. By F. W. Nash, Scranton, Pa. Discussion by Arlo M. Dunn, Omaha, Neb.

1:45 P.M. Paper: The Etiology, Diagnosis, Classification, Prognosis and Treatment of Radicular Resorption on Teeth. By John A. Marshall, University of California. Discussion by A. H. Ketcham, Denver, Colo.

3:00 P.M. Closing business session:
Final committee reports.
Installation of officers.
Adjournment.

Hotel Rates and Reservations

Convention headquarters will be at the Oklahoma Biltmore Hotel. *Special* room rates for those attending the convention are $2.00 per person in double and twin-bedded rooms; $2.50 and $3.00 in single rooms. Each room is equipped with bath, radio, circulating ice water and ceiling fan.

In making reservations, advise the hotel you want the *special rate* made to members of the convention and designate the exact type and priced room you desire.

Do your part and avoid confusion and misunderstandings. Be *specific* in making reservations.

T. W. SORRELS, Chairman,
Local Arrangements Com.

Colorado State Board of Dental Examiners

A meeting of the Colorado State Board of Dental Examiners will be held at Denver, December 12.

N. C. GUNTER, Secretary,
610 Thatcher Building,
Pueblo, Colorado.

Fisher's Orthodontic Directory

Fisher's Orthodontic Directory will be published in January, 1934. All changes of addresses should be sent to the editor, and new members who are eligible to have their names listed should communicate immediately with

CLAUDE R. WOOD, Editor,
Medical Arts Building,
Knoxville, Tenn.

St. Louis Study Club of Dentistry

The St. Louis Study Club of Dentistry, organized for the purpose of providing extension courses in dental subjects, without charge, to ethical members of the profession, will open its sixteenth term, October 18, 1933. The sessions are held from eight to ten o'clock on Wednesday evenings, at the St. Louis University Dental Dept., Grand Blvd., and Caroline Street, and Washington University Dental Dept., 4559 Scott Ave.

The classes are divided into Groups A and B which will meet on alternating Wednesdays, eliminating those too near the holidays. This will give the students the opportunity of selecting two subjects for the season.

The following subjects will be covered during the term:

Dental Roentgenology.
Crown, Bridge and Ceramics.
Dental Economics.
Conductive and Local Anesthesia.
Root Canal Therapy.
Operative Dentistry.
All Cast Removable Bridgework.
Oral Diagnosis and Diseases of the Mouth.
Cast Partial Dentures.
Anatomy of the Head and Accessory Sinuses.
Vincent's Infection and Associated Bacteriology.
Pyorrhea and Oral Prophylaxis.
Dental Drugs and Prescription Writing.
Public Speaking (Special Course).

The St. Louis Study Club of Dentistry Bulletin will be ready for distribution October 1.

For information, address Dr. Frank C. Rodgers, Missouri Theater Bldg., St. Louis, Mo.

Notes of Interest

Dr. Perry B. Clark announces the removal of his offices to 40 South Third Street, Columbus, Ohio. Practice limited to orthodontia.

Dr. William R. Root announces the opening of his office at 925 Delaware Avenue, Buffalo, N. Y. Practice limited to orthodontia.

Dr. Josephine M. Abelson and Dr. Sidney E. Riesner announce the removal of their office to 136 East Thirty-Sixth Street, New York, N. Y. Orthodontia exclusively.

Dr. Arthur V. Greenstein announces the opening of a branch office at 31 Mamaroneck Avenue, White Plains, N. Y., Tuesday and Saturday afternoons by appointment. Practice limited to orthodontia.

Dr. A. B. Horn announces the removal of his office to 21 Adams Street, Montgomery, Alabama. Practice limited to orthodontia and children's dentistry.

Dr. James Earl Rook announces his location in the Gorelock Building, Webster Groves, Mo., for the practice of orthodontia, exclusively.

Dr. Dennis D. Glucksman announces the removal of his office to 119 West 57th Street, New York, N. Y. Practice of orthodontia.

Dr. B. Holly Broadbent announces the location of his new offices for the practice of orthodontia exclusively, 1400 Keith Building, Cleveland, Ohio.

Dr. L. E. Habegger announces his new location in the Bay Cities Building, Santa Monica, Calif. Practice of orthodontia.